EXHIBIT A
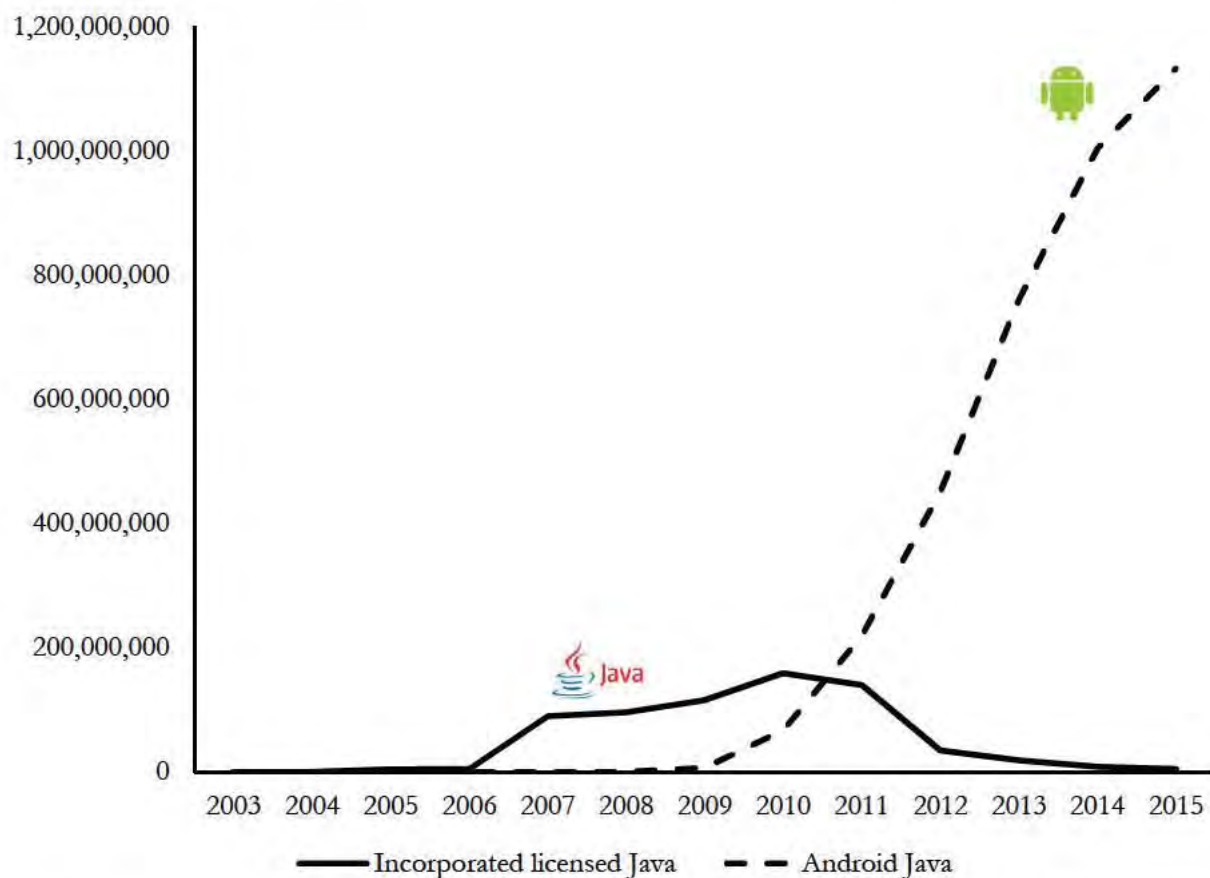# PART 2 OF 2

REDACTED VERSION OF DOCUMENT SOUGHT TO BE SEALED

Figure 65: Java-based Android vs. Oracle Java Smartphone Shipments (2003-2015)[472]

This chart suggests that Google's entry into the market with Java-based Android was well-timed. After a short ramp up in 2008 and 2009, Android shipments grew dramatically.

     c) Android competition and additional harm in mobile feature phones

343. Today, Oracle's foothold in feature phones faces an imminent threat from Java-based Android. Google has repeatedly announced its intentions to enter and win particularly price-sensitive emerging market users with Android.[473] Oracle enjoys licensing revenues from Java-based feature phones in these emerging markets.[474]

---

[472] Exhibit 3.

[473] Puneet Sikka, *Google Looks to Expand Android One's Reach,* Market Realist (Nov. 28, 2014), http://marketrealist.com/2014/11/google-looking-expand-android-ones-reach-indias-success.

[474] Oracle Gets To $37 With Europe, Emerging Markets Growth, Forbes (Aug. 12, 2011), http://www.forbes.com/sites/greatspeculations/2011/08/12/oracle-expands-in-emea-on-30-regional-growth/#76561de91226.

Expert Report of Adam Jaffe

344.   Hiroshi Lockheimer, SVP Android, Chrome OS & Chromecast, described one device - Android

One - as part of its effort to penetrate emerging markets in his deposition,:

> Android One is an initiative around bringing low-cost but very high-quality phones to the emerging markets, so it's a brand that manufacturers can adopt if they -- if they adhere to certain guidelines. It's a brand that they can use to market their device that -- that to customers, end users, signifies high quality, low cost, always having the latest version of the operating system, security updates and so on.[475]

345.   Emerging markets are a strategic focus for Google's mobile business. In a recent earnings call,

Sundar Pichai, CEO of Alphabet stated, "And on the platform side, look, we continue to see tremendous

momentum overall on Android. In just over a year, we've gone from 1 billion to 1.4 billion users. So

obviously, that translates into huge opportunities for OEMs, and that's what we are seeing. Especially,

there are whole new markets opening up. There's the next billion users coming online in emerging

markets. And businesses, I mean [ph] enterprises, a whole opportunity for OEMs as well. So I think

there's a lot of room ahead."[476] Additionally, Pichai states "We're also seeing strong mobile momentum in

many emerging markets like India, which is the #2 country for mobile search queries behind the U.S. This

is the result of our laser focus on helping users quickly find the right information. People just want to be

able to find the information they are looking for on mobile without having to worry about whether it lives

on the mobile web or within apps. Mobile app usage as well as web usage is accelerating significantly."[477]

346.   Google has long understood that this emerging market, low-cost mobile phone strategy was part

of its goals for Android. In the 2010, Google internal Android strategy document I discussed above, phase

four (2013+) includes the plan to "Scale Volume of Devices (e.g. go down-market to feature phones).

---

[475] Deposition of Hiroshi Lockheimer, December 8, 2015, p.138:4-12

[476] Alphabet Inc Earnings Call Transcripts Q3 2015 (Oct. 22, 2015), pg. 10.

[477] Alphabet Inc Earnings Call Transcripts Q3 2015 (Oct. 22, 2015), pg. 6.

Figure 66: Android Four Phase Strategy (2010)[478]
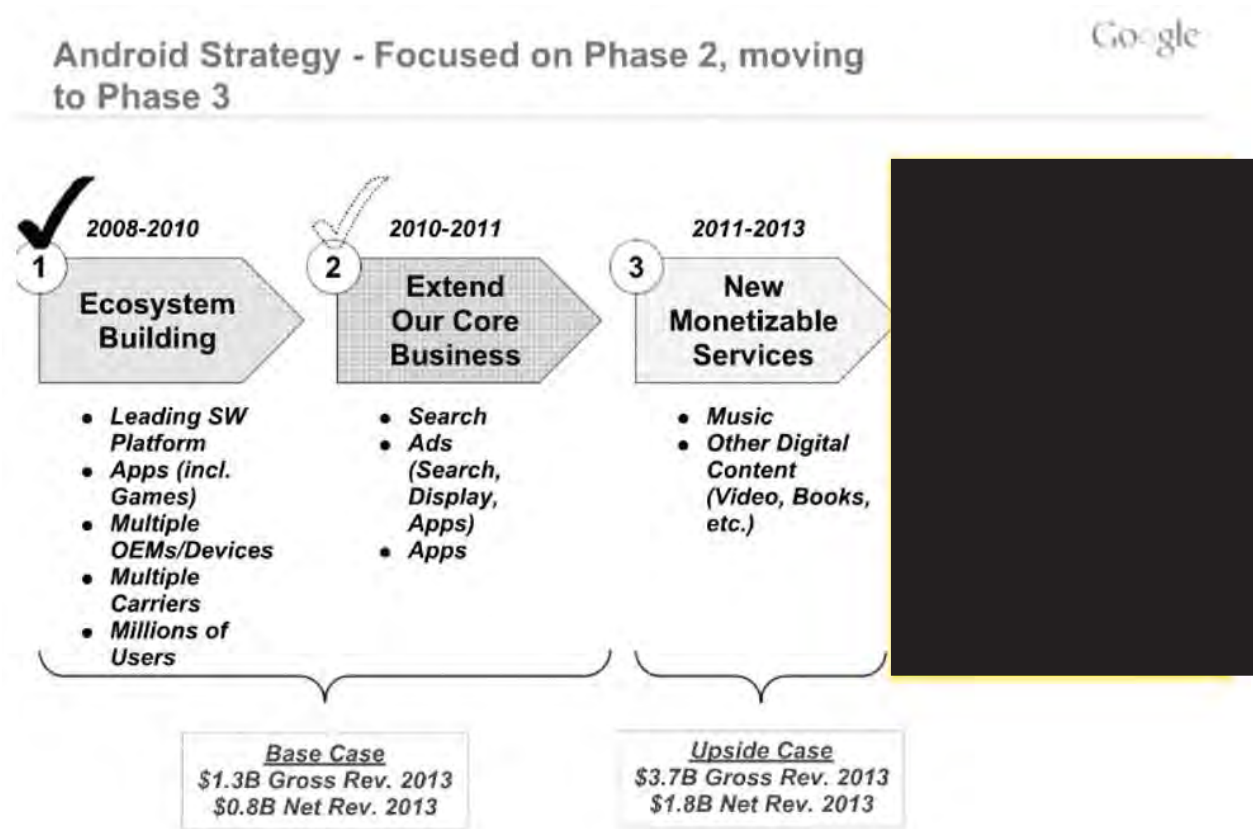
347.   Recent internal Google documents indicate it expects Android to replace Java on feature phones (which Java has been licensed for) within the next five years. A chart from Google's 2015 "State of the Mobile Developer" presentation explaining this timing is shown below in Figure 67.

---

[478] TX 1061.

Figure 67: State of the (Mobile) Developer presentation (2015)[479]

Most feature phone users expected to become Android phone users
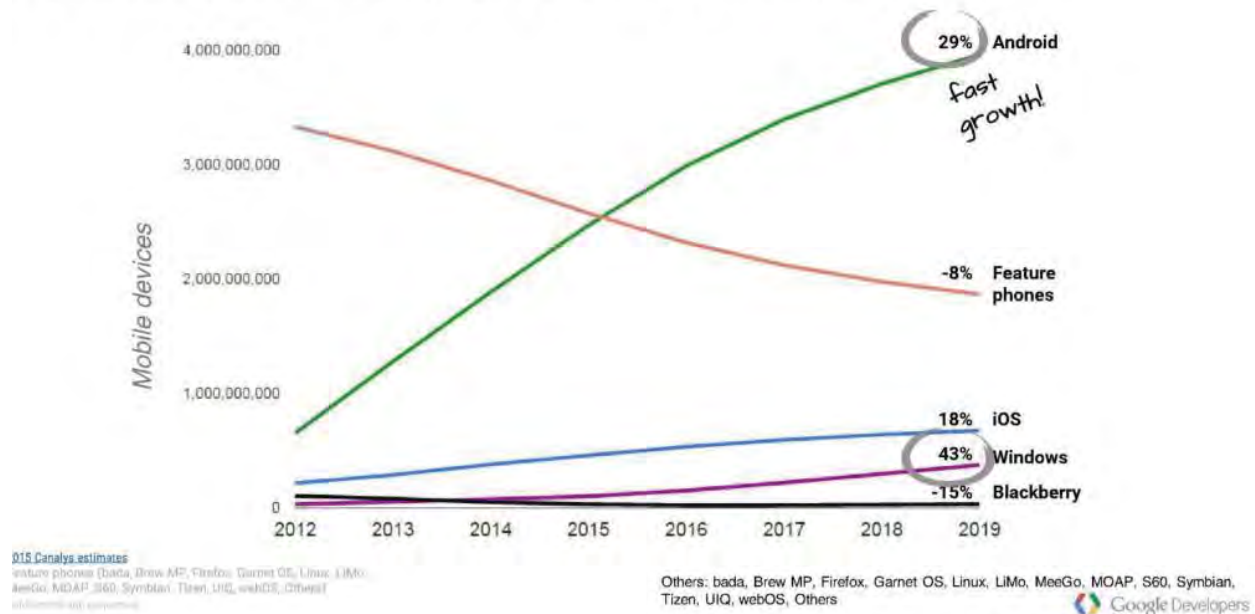
d)   Conclusion

348.   The mobile phone device category brings the harm to Oracle's potential markets into particularly stark relief. This category is experiencing explosive growth, emerging as perhaps today's key user computing platform. Java's history of success across multiple devices and its early success in mobile phones (approx. 80% share) positioned it to participate in this mobile phone device growth. Instead, Google's Java-based Android platform competes with and substitutes for the Java platform and dramatically weakens and virtually eliminates Oracle's licensing with almost all of its key mobile accounts. Daniel Green, then a member of Java's mobile account group summed up his experience competing with Android-based Java in a 2010 email, "I see Android and am run over by it in all accounts."[480]

2)   Other mobile devices – tablets, e-readers

349.   As I describe above, Android began as and remains Google's primary means of controlling its mobile ecosystem. And the harm to Oracle is acutely felt in the mobile segment. Tablets, e-readers and wearables are additional mobile device categories that are closely related to and often build off mobile

---

[479] GOOG-00105585, at 5630.

[480] OAGOOGLE0000799926.

phone application platforms. In this section, I describe the harm that Oracle has experienced in each of these additional mobile device categories.

a)   Tablets

350.   Oracle's Java and Google's Java-based Android platforms compete in the tablet device category. A number of Java licensees like RIM face direct competition from Android for tablets. Google has also sought to supplant the Java platform with its Android platform with tablet OEMs that are or could be Java platform licensees. In both ways, the competition from Java-based Android in the tablet device category causes substantial harm to Oracle's licensing of its Java platform for tablets.

(i)   Market opportunity

351.   A tablet is a portable computer that has touchscreen capabilities.[481] In April of 2010, Apple released the original iPad, selling 300,000 units in the first day and two million units within the first two months.[482] Nineteen million tablets were sold globally in 2010, increasing to over 230 million by 2015.[483] Figure 68 displays the actual and potential shipments of tablets this decade. This demonstrates that the tablet market offers tremendous market opportunity.

---

[481] Definition of Tablet Computer, PC Mag, http://www.pcmag.com/encyclopedia/term/52520/tablet-computer (last visited January 21, 2016).

[482] Jacob Kastrenakes, *The iPad's 5th Anniversary: A Timeline of Apple's Category-Defining Tablet,* The Verge (Apr. 3, 2015), http://www.theverge.com/2015/4/3/8339599/apple-ipad-five-years-old-timeline-photos-videos.

[483] *Projected Unit Shipments of Tablets Worldwide from 2010 to 2019,* Statista, http://www.statista.com/statistics/269912/worldwide-tablet-shipments-forecast (last visited January 25, 2016).

162   Expert Report of Adam Jaffe

Figure 68: Actual and projected shipments of tablets worldwide from 2010 to 2019 (in million units)[484]
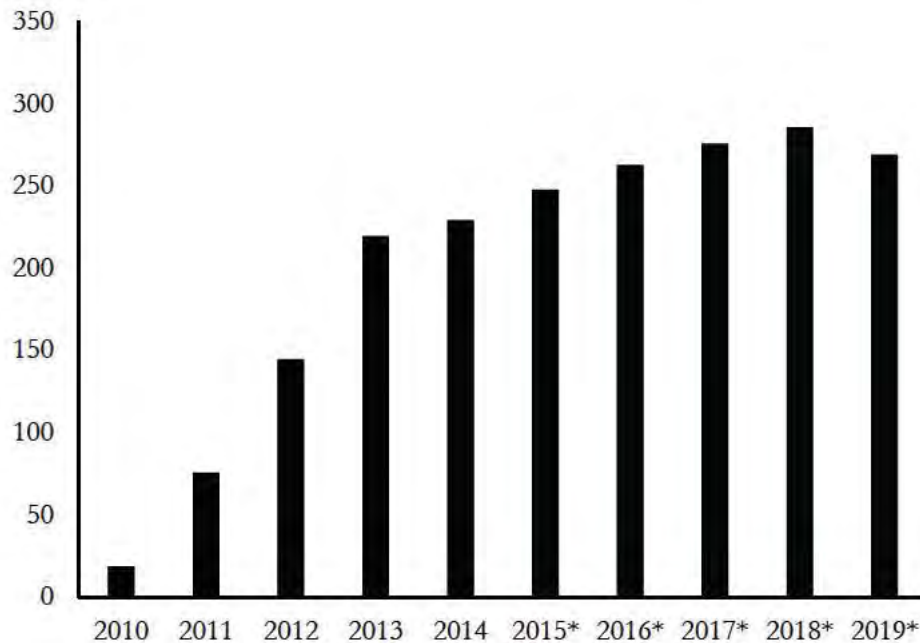
        (ii)   Java platform for tablets

352.   The tablet market is a natural fit for the Java platform. Java had enjoyed widespread adoption in mobile phones, as discussed above and was also used in PDAs (Personal Digital Assistant).[485] Oracle licensed Java for use in tablets as early as 2005.[486]

353.   Oracle has continued to actively pursue licensing opportunities in the tablet market. ███

██

---

[484] *Projected unit shipments of tablets worldwide from 2010 to 2019 (in million units)*, Statista (Mar. 2015), www.statista.com/statistics/269912/worldwide-tablet-shipments-forecast/.

[485] As early as 2002, there already existed touchscreen PDAs that ran Java applications—for example, the Sharp Zaurus PDA was demonstrated at the JavaOne conference in 2002 and already had a growing community of commercial and open-source developers who were writing applications for it.
Jonathan Knudsen, *Java Programming on the Sharp Zaurus*, Oracle Technology Network (July 2002), http://www.oracle.com/technetwork/systems/index-156187.html.

[486] OAGOOGLE0100010355, p. 3. ████████████████████████████
████████ Pcs")

Expert Report of Adam Jaffe

██.[487] The deal did not materialize;
rather the Playbook now supports Android applications.[488]

(iii)   Java-based Android in tablets

354.   Google's Java-based Android platform has enjoyed much success in the tablet market,
diminishing the Java platform's market opportunity in this market segment. As early as 2011 and 2012,
Android topped the list of platforms targeted by tablet application developers.[489] In February of 2011
Motorola released the first Android-powered tablet, the Xoom.[490] In 2012, Samsung, Acer, Nexus,
Lenovo and several other OEMs began selling Android-powered tablets. In 2014, Android further
expanded its market share of tablets, topping the market with 67.7% of unit shipments (159.5 million
tablets shipped), ahead of second-place Apple's 27.5% of unit shipments (64.9 million tablets shipped).
IDC's Research Director for Tablets attributed Android's success in the tablet market to the price pressure
on tablets and "an influx of entry-level products, which ultimately serves Android really well."[491]

(iv)   Android competition and market harm to Oracle in tablets

355.   ██

██

██

██

██████.[493] In his deposition, Donald Smith, Oracle's Senior Director of Product Management, confirmed
this potential fit and the market opportunity lost to Android:

██

██

---

[487] OAGOOGLE2000180086.

[488] Seth Weintraub, The Blackberry Playbook Will Run Android Apps, Fortune (Mar. 24, 2011),
http://fortune.com/2011/03/24/the-blackberry-playbook-will-run-android-apps.

[489] GOOG-00113010, at -3035, GOOG-00115202, at -5247.

[490] Motorola XOOM MZ604, GSMArena, http://www.gsmarena.com/motorola_xoom_mz604-3833.php.

[491] Press Release, Worldwide Tablet Growth Expected to Slow to 7.2% in 2014 Along with First Year of iPad
Decline, According to IDC, IDC (Nov. 25, 2014), http://www.idc.com/getdoc.jsp?containerId=prUS25267314.

[492] Deposition of Donald Smith, Nov. 20, 2015.

[493] Deposition of Donald Smith, Nov. 20, 2015.

                                                             Expert Report of Adam Jaffe

███ [494]

356. ███

███████████████████████████████████████ . [495] Such pricing pressure further indicates the market harm that Oracle faced from Android's copying of the Java API packages and entry into tablet device category. Price erosion is a classic result of competition. In his deposition, Oracle's Director of Worldwide Java Sales confirmed that Oracle is being pushed out of the tablet market.

███

357.   Android also competes against the Java platform for tablets with respect to the tablet developer community, which competition causes harm to Oracle's potential tablet market.

358.   Table 9 below shows the results of a 2011 survey of developers asking what tablet operating system or application platform they would be developing on then and in the future. As early as 2011 we see wide adoption of Android ("Android 2.3 or earlier" and "Android 3.0 Honeycomb"), rather than the Java platform.[497]

Table 9: Mobile Developer Preference Survey (2011)[498]

Operating System	Currently Targeting	Plan to Target within 6 Months	Plan to Target in 7 to 12 Months	Plan to Target in over 1 Year	No Plans
Android 2.3 or earlier	44.3	22.8	10.1	6.0	16.8
Microsoft Windows 7	43.0	18.5	9.3	5.3	23.8
Apple iOS	42.7	26.0	11.3	4.0	16.0
Microsoft Windows Embedded Compact 7	27.8	20.5	14.6	3.3	33.8
Android 3.0 Honeycomb	26.2	34.9	18.8	9.4	10.7

---

[494] Deposition of Donald Smith, Nov. 20, 2015, p. 114:11-14.

[495] Indirect Executive Summary Form—Java, OAGOOGLE2000180051, at -0056.

[496] Deposition of Michael Ringhofer, Dec 2 2015.

[497] GOOG-00113010, at -3035.

[498] GOOG-00113010, at -3035.

Expert Report of Adam Jaffe

RIM Blackberry Playbook OS	21.2	15.9	14.6	7.3	41.1
HP (Palm) Web OS	13.3	24.7	14.7	4.0	43.3
Other Tablet Operating System	8.4	16.1	15.4	2.1	58.0
MeeGo	7.4	22.1	13.4	4.0	53.0

b)   e-readers

359.   Closely related to both mobile phones and tablets, e-readers are a significant device category with robust licensing potential. Instead of buying books and storing them physically, e-readers are single purpose lightweight digital devices that permit users to save and read books and other published materials, replacing the need for physical versions of books, magazines and newspapers.

360.   I observe a similar competitive pressure and market harm pattern in e-readers as I see in other mobile devices. The Java platform was present in early e-readers including the Kindle, where it remains today. Since Android's release, however, Google has exerted significant competitive pressure by trying to displace the Java platform in e-readers and also by providing e-reader technology on Android-powered tablets which compete with traditional e-readers. Finally, I also observe harm to the Java e-reader developer community who cannot port their apps to Android because Google chose to make Android incompatible with the Java platform.
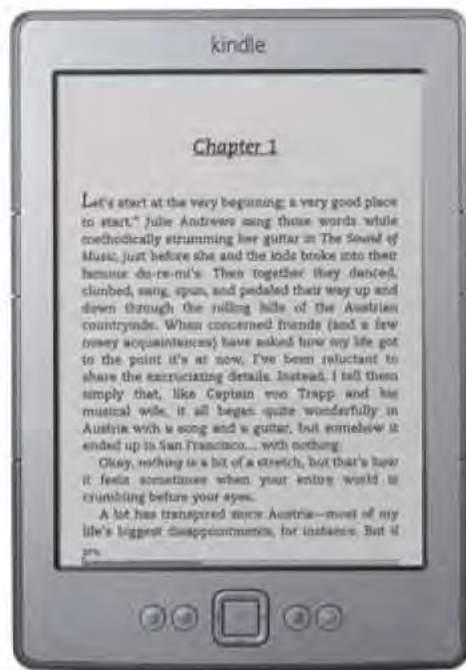
(i)   Market opportunity

361.   While the first generation of e-readers was introduced in 1998, they became popular with the release of Amazon's Kindle in 2007. [499] Within hours, Kindle was sold out on the day of its release, with a price of $399.[500] In its first year, Kindle sold more than 250,000 units. [501] Figure 69 shows a version of an early Kindle.

---

[499] B. Bakelaar, *E-readers behind the scenes,* Princeton Library (July, 25 2012), http://princetonlibrary.org/blog/2012/07/e-readers-behind-scenes

[500] Yoan Jo, et. al., Amazon Kindle Consultant's Report, SCCG (April 2010), http://www-scf.usc.edu/~yoanjo/amazon%20kindle.pdf

[501] Zach Pontz, *A Year Later, Amazon's Kindle finds a Niche,* CNN (Dec. 4, 2008), http://www.cnn.com/2008/TECH/12/03/kindle.electronic reader/

Expert Report of Adam Jaffe

Figure 69: Amazon Kindle e-reader[502]

Since the Kindle launch, e-readers improved in design and capabilities, such as weight, speed and storage.

362.   By 2012, global shipments of e-readers reached 40 million units per year.[503] Though there has been some decline because users select tablets that include e-reading functionality, the market for e-readers remains important today. In one year, Amazon sold more than 250,000 e-readers.[504] Amazon has the largest market share and 75% of all e-books sold in the US are downloaded from Kindle bookstore.[505]

> (ii)   Android competition and market harm in e-readers

363.   As I discuss above, the industry-leading Kindle ███████████████████████████
████████████████████ ██ ███████████████████████████████

---

[502] *See, e.g.*, Kindle, 6" E Ink Display, Wi-Fi, Amazon.com, http://www.amazon.com/Kindle-eReader-eBook-Reader-e-Reader-Special-Offers/dp/B0051QVESA (last visited Feb. 5, 2016).

[503] Unit Sales of E-Readers Worldwide from 2010 to 2015 (in millions), Statista, http://www.statista.com/statistics/326906/worldwide-unit-sales-ereaders/.

[504] Zach Pontz, *A Year Later, Amazon's Kindle finds a Niche*, CNN (Dec. 4, 2008), http://www.cnn.com/2008/TECH/12/03/kindle.electronic reader/.

[505] Michael Kozlowski, *The State of the e-Reader Industry in 2015*, Good eReader (Sept. 24, 2015), http://goodereader.com/blog/electronic-readers/the-state-of-e-reader-industry-in-2015.

Expert Report of Adam Jaffe

████████████████████████████████████

████████████████████████████████

██████████████.[507] Indeed, as I discuss above, the Amazon multi-purpose tablet, the Kindle Fire, adopted Android rather than the Java platform.

364.   As with tablets and mobile phones, Oracle also faces competition from Java-based Android in e-reader developer adoption. As I discuss throughout this report, Java is a network good and the size and health of its developer community is critical to Oracle's ability to license the Java platform. Table 10 below shows the results of an early survey – in 2012 – that encompasses both e-reader and traditional tablet formats. Developers were asked: "If you develop applications for the tablets or slates, which of the following tablet platforms do you target?" First, I note that developers are selecting between the Java-based Android platform and Java-licensed platforms like Blackberry and Kindle. Google's competition for developer mindshare between its Android platform and Java-licensed platforms causes harm also to Oracle's potential market for developers who are now writing apps for Java-based Android which is incompatible with the Java platform rather than writing apps for the Java platform.

Table 10: Android Tops List of Tablet Platforms That Developers Target in 2012[508]

Operating System	Percent of Developers on Each Platform (Note: Developers Can Develop to Multiple Platforms)
Android	86.3%
iOS	56.9%
Windows	55.3%
Blackberry	31.8%
Kindle	17.3%
NOOK	10.6%
Other	2.4%

As Table 10 above shows, Oracle's potential market for application developers for the tablet and e-reader device categories is harmed by competition from Android.[509]

████████████████████████████████████ OAGOOGLE2000180083, at -0083-84.

[507] ███████████████████████████████████ OAGOOGLE2000180083, at -0084.

[508] GOOG-00115202, at -5247. Note that this multiple response question allowed the developers to select as many responses as they wished, and thus the total number of cases will not come to 100%.

[509] GOOG-00115202, at -5247. *See also* OAGOOGLE2000644011.

168   Expert Report of Adam Jaffe

c)   Wearables

365.   Another mobile device category is known as wearables. Wearables are computing devices that, as the name suggests, are incorporated in clothing or other accessories (e.g. rings, watches, bracelets). As in each of the mobile device categories above, I observe harm to Oracle's potential market from the competitive entry and substitution of Android in place of an early leadership position by the Java platform.

(i)   Market opportunity and early Java presence in the wearable device category

366.   Wearables are a large and growing opportunity. The market of wearable devices is predicted to have 170 million devices in use by 2017 and to be worth $8.2 billion.[510]

367.   Sun was an early pioneer in the creation of connected wearable devices. In 1998, attendees of the JavaOne conference were given a "Java Ring" embedded with a microprocessor that ran the Java platform.[511] A photograph of the Java Ring is pictured below in Figure 70.

Figure 70: Java Ring

At the time, Jakob Nielsen of the Nielsen Norman Group commented on the potential opportunity in wearables, "[T]he deciding point is that you will always have it with you. Many aspects of computing change once there is no need to go to a special room to get at the computer."[512]

368.   Oracle continues to offer the Java platform to wearable device manufacturers and providers. At each of the recent JavaOne and Oracle OpenWorld conferences, there were panels on Java's use in

---

[510] Bloomberg, *Who Will Win the War on Wearables?*, The Telegraph (July 12, 2014, 7:00am), http://www.telegraph.co.uk/technology/10961228/Who-will-win-the-war-on-wearables html.

[511] Java Ring Definition, Tech Target, http://searchsoa.techtarget.com/definition/Java-Ring (last visited Jan. 20, 2016).

[512] Jakob Nielsen, *The Java Ring: A Wearable Computer,* Nielsen Norman Group (March 1, 1998), https://www.nngroup.com/articles/javaring-wearable-computer/.

169   Expert Report of Adam Jaffe

wearables.[513] The Senior Java Developer Community Manager, Tori Wieldt commented on development options for wearables: "Why not use existing cheap technology to build your own wearable Java-powered device? Using Java allows you to use your existing skills, build infrastructure, and testing tools."[514]

<div align="center">(ii)   <u>Android competition and market harm from Java-based Android</u></div>

369.   Android has extended its presence from mobile phones and tablets into wearables. In 2015, Android captured approximately 17% unit share of the wearable device category. This has been projected to grow to nearly 40% by 2019 with a projected 173 million units shipped.[515] Today, Google's Android-based wearables platform, Android Wear, is the basis of many smartwatches from large manufacturers including LG, Motorola, Huawei, Asus, and Sony.[516] The success of Android incorporating unlicensed Java API packages, in wearable shipments demonstrates the value of Java-based solutions in the wearable space because they are substitutes for the reasons I discuss above, and is an indication of the harm to Oracle's potential market in the wearable device category due to Android.

370.   Android's entry into wearables directly harmed Oracle's potential market in the recent case of Samsung's selection of a platform for its smartwatch. ███[518].

---

[513] Tori Wieldt, *IoT: Wearables!*, The Java Source, Oracle (Aug. 20, 2014), https://blogs.oracle.com/java/entry/iot_wearables.

[514] Tori Wieldt, *Learn About Wearables and Java*, The Java Source, Oracle (Jan. 22, 2015), https://blogs.oracle.com/java/entry/wearables_and_java.

[515] Mark Sullivan, *IDC: Android Wear Market Share Will More Than Double by 2019*, VentureBeat (Sept. 14, 2015, 11:49am), http://venturebeat.com/2015/09/14/idc-android-wear-market-share-will-more-than-double-by-2019/.

[516] Android Wear Website. https://www.android.com/wear/

[517] OAGOOGLE2000054847.

[518] Deposition of Michael Ringhofer, December 2, 2015. P. 83:6-10.

          170   Expert Report of Adam Jaffe

d)   Harm to Oracle across the Java mobile development community

371.   In addition to causing harm by impeding licensing sales in the mobile device category, Android's Java-based platform seeks to and does draw developers away from the Java platform. As I discuss throughout the report, Java is a network good – the more developers it attracts, the greater its value. When Java-based Android competes with Oracle for developers, it is harming Java's potential market for developers who write apps for the Java platform.

372.   For example, an analysis of "Android Impact on Java ME platform" performed in 2011 analyzed the negative impact on Java's developer ecosystem. Figure 71 below shows the executive summary from this presentation.

Figure 71:

---

[519] OAGOOGLE2007501106, at -1107.

373.   The same presentation ██

██

████████████████   The analysis concludes that, ███████████████████████████████

████████████████████████

374.   Additional contemporaneous industry data supports this conclusion. In 2008, Java-based Symbian and Java ME were the two most-used development platforms by mobile app developers.[521] Two years later, Android was the most popular platform, with roughly 60 percent of all mobile developers developing on Android.[522] The adoption of Android among developers appears to have impacted the relative attractiveness of Java ME. In 2011, Java ME had one of the highest reported abandonment rates, with 35% of developers who were currently using Java ME planning to drop the platform.[523] Figure 72 below illustrates the divergence of developers using Android and Java mobile developer platforms.[524]

Figure 72: Percentage of developers using a platform (2010-2014)[525]

---
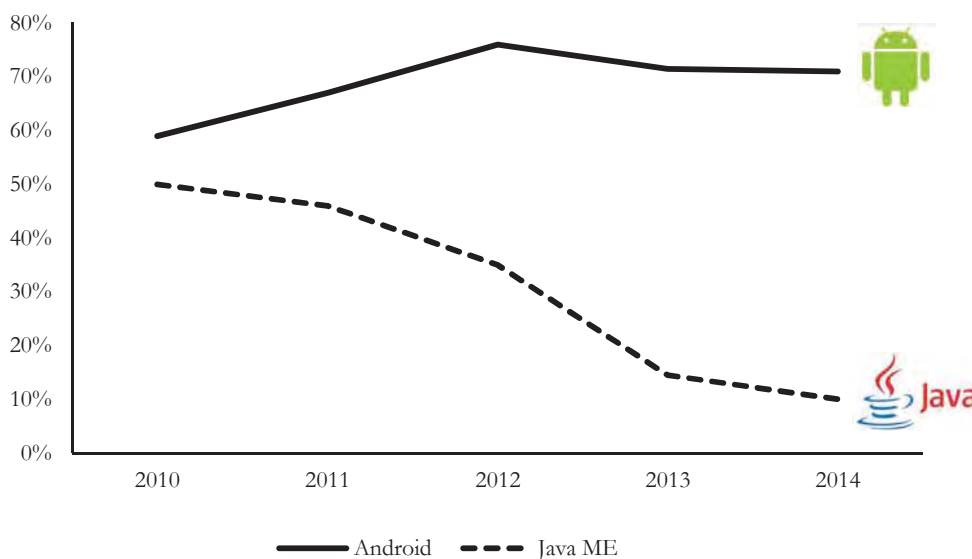
[520] OAGOOGLE2007501106, at -1114-15.

[521] Mobile Developer Economics 2010 and Beyond, Vision Mobile, p.5.

[522] Mobile Developer Economics 2010 and Beyond, Vision Mobile, p.5.

[523] Developer Economics 2011, Vision Mobile (June 2011).

[524] I understand from the report of Professor Doug Schmidt that there is a meaningful degree of overlap between Java ME and Java SE.

[525] Developer Economics 2011, Vision Mobile (June 2011), p.16. Felix Richter, App Developers Increasingly Focus on Android and iOS, Statista (July 3, 2012), http://www.statista.com/chart/424/app-developers-increasingly-focus-on-android-and-ios/. Developer Economics Q1 2014, State of the Developer Nation, Vision Mobile (February 2014), p.16; Keystone Analysis. Note only Q1 and Q3 data was available for 2013 and only Q1 data for 2014.

172   Expert Report of Adam Jaffe

375.   This migration of developers was observed by leading technologists at Oracle. Mark Reinhold, Chief Architect of the Java Platform Group at Oracle described the impact of Android on Java's development community, ██

██.,,[526]

376.   The impact of migration among developers from Java to Android is significant. As I explained above, the Java developer community is an important Oracle asset. Developer migration, whether reflected in a decline in the number of Java developers or slowed growth of platform adoption, is a clear example of harm to Oracle from Google's use of the Java API packages.

3)   Summary of harm on mobile devices

377.   Android is a mobile ecosystem first, and thus the most significant harm to Oracle is felt first across mobile device categories – mobile phones, tablets and e-readers. As I demonstrate above, Google's Java-based Android platform caused Oracle significant harm to the market for the Java platform. I find evidence of that harm in competition from Android and loss to Oracle across virtually all current and prospective Java licensees. That harm extends also to competition in the developer community – and as I have noted above through my discussion of network effects, the platform nature of Oracle's Java business model means that competition for Java application developers will redound to competition for Java licensing revenue. I also show that these mobile devices are experiencing substantial proliferation through this period, ushering a new era of mobile computing – this means that the opportunity lost through the introduction of competition against the Java platform by Java-based Android's is even more significant.

378.   For these reasons, the harm that Oracle experiences in the mobile device category is more than enough to find that Google's copying is not a fair use based on a Factor 4 analysis. That being said, I also look at Android's effects on Oracle's market for other device categories. In the next sub-sections I review these categories.

4)   Automotive

379.   Over the last decade, cars have begun to incorporate connected computing features, including turn-by-turn mapping directions, media offerings like streaming audio and video and an array of other features. Dubbed, "connected cars," the automotive industry has become an important customer for application platform licensing. The Java platform has been licensed to automobile OEMs from the early days of this device category. Following its release in mobile phones, Google has sought to increase its

---

[526] Deposition Transcript of Mark Reinhold, Aug. 5, 2011, 65: 4-6

device categories covered by Java-based Android, and connected cars have been a target of these efforts. In this section, I find that connected cars are an important device category in which Oracle experiences market harm from Android.

<div align="center">a)   <u>Market opportunity</u></div>

380.   Car manufacturers have been looking for different ways to incorporate new technologies into vehicles for decades.[527] In 1996, GM began installing OnStar in select vehicles.[528] OnStar provided vehicles with GPS tracking and wireless communications for the driver.[529] As mobile technology became more sophisticated in the mid 2000's , cars began to sync with mobile devices.[530]

<div align="center">b)   <u>Competition and market harm from Java-based Android</u></div>

381.   Java provided the application platform for the first major connected car systems. In 2000, the Java platform was licensed to GM for its OnStar connected car platform. [531] OnStar provided users with GPS and also wireless communication capabilities to vehicles.[532] The OnStar service was in 1 million vehicles by the end of 2000.[533]

382.   The 2004 JavaOne conference announced that Sun had reached an agreement that would put the Java platform in multiple BMW models. The BMW connected car would include a dashboard computer

---

[527] In 1966 GM created the "Driver Aid, Information and Routing" (DAIR) initiative. This system provided vehicles with directions, accident reports and even road conditions. Deloitte University Press, http://dupress.com/articles/Internet-of-things-iot-in-automotive-industry/#end-notes (last visited January 20, 2016).

[528] In 1966 GM created the "Driver Aid, Information and Routing" (DAIR) initiative. This system provided vehicles with directions, accident reports and even road conditions. Deloitte University Press, http://dupress.com/articles/Internet-of-things-iot-in-automotive-industry/#end-notes (last visited January 20, 2016).

[529] In 1966 GM created the "Driver Aid, Information and Routing" (DAIR) initiative. This system provided vehicles with directions, accident reports and even road conditions. Deloitte University Press, http://dupress.com/articles/Internet-of-things-iot-in-automotive-industry/#end-notes (last visited January 20, 2016).

[530] Deloitte University Press, http://dupress.com/articles/Internet-of-things-iot-in-automotive-industry/#end-notes (last visited January 20, 2016).

[531] THG Reporting Team, GM, Sun Agree to Make OnStar Java, Tom's Hardware (Oct. 17, 2000), http://www.tomshardware.co.uk/gm,news-2420.html.

[532] High Tech With A Personal Touch, OnStar, https://web.archive.org/web/20000303011456/http://www.onstar.com/about/systems.htm (Last visited January 20, 2016).

[533] THG Reporting Team, GM, Sun Agree to Make OnStar Java, Tom's Hardware (Oct. 17, 2000), http://www.tomshardware.co.uk/gm,news-2420.html.

174   Expert Report of Adam Jaffe

that controlled functions including: air conditioning, navigation, and entertainment in the BMW 1, 3, 5 and 6 series vehicles.[534]

383.   More recently, the next generation of connected device OEMs and system developers have adopted the Java platform ███

██████████████████████ ██

██

████████ ███

██

██[537]

c)   Android competition and market harm

384.   In 2014, Google's Java-based Android began competing with the Java platform by offering car manufacturers a version of Android called Android Auto. [538]

385.   Volkswagen is a current Java licensee, but, despite Oracle's efforts, opted to use Android in its automotive infotainment system instead of Java.[539] Not only did Oracle lose the Volkswagen automotive infotainment opportunity to Android, but in the short time since launch, Java-based Android Auto has achieved substantial adoption by an array of other leading automobile OEMs.[540] ████████████████████

██

███",[541] GM, Honda, Audi, Hyundai, and

---

[534] Stephen Shankland, Sun Puts Java into Gear for Cars (June 29, 2004), http://www.zdnet.com/article/sun-puts-java-into-gear-for-cars.

[535] OAGOOGLE2000118005

[536] OAGOOGLE2000128485, at -8186.

[537] OAGOOGLE2000130663, at -0664.

[538] Press Room, Open Automotive Alliance, http://www.openautoalliance net/#press.

[539] OAGOOGLE2000055353; Deposition of Michael Ringhofer, December 2, 2015. p. 26:7-9; 110:9-12

[540] Providers include : Abarth, Acura, Alfa Romeo, Audi, Bentley, Buick, Cadillac, Chevrolet, Chrysler, Citroen, Dodge, DS, Fiat, Ford, GMC, Holden, Honda, Hyundai, Infiniti, Jeep, Kenwood, Kia, Mahindra, Maserati, Mazda, Mitsubishi, Nissan, Opel, Peugeot, Pioneer, Ram, Renault, Seat, Skoda, Ssangyong, Subaru, Suzuki, Vauxhall, Volkswagen and Volvo Android Auto, Android, https://www.android.com/auto (last visited January 20, 2016).

[541] GOOG-00347724, at -7727.

NVidia joined Google to form the Open Automotive Alliance, which now consists of about 40 car OEMs and other partners.[542]

5)   Internet of Things

386.   Similar to the rise of connected cars, a new device category has emerged for "Internet of Things" devices. Internet of Things refers to a variety of user devices and services that have become Internet enabled and connected.[543] These connected user devices are in line with traditional deployments of the Java platform for resource-constrained dedicated devices, and Oracle has been successful in licensing its platform to device manufacturers and providers in this category. As with the previous device categories, Android has expanded its mobile platform to compete with Java and has thereby imposed harm on Oracle in this category.

a)   Market opportunity

387.   According to IDC, the market for Internet of Things was worth $656.8 billion in 2014 and is estimated to grow to $1.7 trillion in 2020.[544]

b)   Harm to Oracle from Java-based Android competition in Internet of Things devices

388.   Oracle licenses Java to device manufacturers and providers of Internet of Things devices and services. The Java platform enables app developers to write applications for Internet of Things devices on various Java editions, including Java SE and Java ME.[545] For example, ███████████████████████ ███████████████████████████████████████.[546]

389.   Google has also expanded its Java-based Android platform to meet the Internet of Things opportunity. Google's offerings are though Project Brillo, a specialized instance of Android still based on the copied Java API packages.[547] Google confirms its entry into Internet of Things in the following

---

[542] Aaron Souppouris, Google launches the Android-based Open Automotive Alliance with Audi, Honda, GM, and more, The Verge (Jan. 06,2014), http://www.theverge.com/2014/1/6/5279116/google-open-automotive-alliance-android-car-announcement. Android Auto, Android, https://www.android.com/auto/.

[543] Jeff Friesen, *Java ME 8 and the Internet of Things*, JavaWorld (Nov. 14, 2014, 12:18pm), http://www.javaworld.com/article/2848210/java-me/java-me-8-and-the-Internet-of-things html.

[544] Steven Norton, *Internet of Things Market to Reach $1.7 Trillion by 2020: IDC*, The Wall Street Journal (June 2, 2015, 7:41am), http://blogs.wsj.com/cio/2015/06/02/Internet-of-things-market-to-reach-1-7-trillion-by-2020-idc/.

[545] *See* Jeff Friesen, *Java ME 8 and the Internet of Things*, JavaWorld (Nov. 14, 2014, 12:18pm), http://www.javaworld.com/article/2848210/java-me/java-me-8-and-the-Internet-of-things html.

[546] Deposition of Michael Ringhofer, Dec. 2, 2015, p.21-23.

[547] Deposition of Hiroshi Lockheimer, Dec. 8, 2015, p. 67-69.

manner, to ██

██

██████

390.   By competing with Oracle for OEMs like Samsung and others, Google's efforts harm the potential market for the Java platform licensing for Internet of Things devices because Android incorporates features of the Java platform but offers it for free and incentivizes potential Java licensees to select Android.

6)   Voice over Internet Protocol (VoIP)

391.   Voice over Internet Protocol (VoIP) is a group of technologies that deliver voice and multimedia data over the internet. A VoIP phone is a telephone set that uses VoIP to convert standard telephone audio into a digital format that can be transmitted over the Internet and also by converting incoming digital phone signals from the Internet into standard telephone audio.[549] As with other device categories, Java has enjoyed significant licensing opportunities with VOIP phones, but it is now losing opportunities to Android. In this way, Oracle suffers harm to its VOIP device category revenue from Google's Android product offerings.

392.   The worldwide services market around VoIP is growing at a compound annual growth rate (CAGR) of 9.7%.[550] The market is estimated to reach a subscriber base of 348.5 million and be worth $136.8 billion by 2020.[551]

393.   Android has enabled a multitude of VoIP applications for both Android tablets and phones. Some commonly used third-party Android apps that enable VoIP calls include Skype, Tango and Viber.[552] Google itself has Google-owned services that provide VoIP functionality for Android devices. For

---

[548] Deposition of Hiroshi Lockheimer, Dec. 8, 2015, p. 69.

[549] *See generally* What is VoIP, VoIP-info.org, http://www.VoIP-info.org/wiki/view/What+is+VOIP (last visited Jan. 25, 2016).

[550] *VoIP Services Market to Expand at 9.7% CAGR Till 2020 Thanks to Increasing Adoption in Residential and Corporate Sectors*, Transparency Market Research (July 5, 2015), http://www.transparencymarketresearch.com/pressrelease/VoIP-services-market.htm.

[551] *Global VoIP Services Market to be Worth US$136.76 Billion by 2020: Transparency Market Research*, Business Wire (Jan. 15, 2015, 6:17am), http://www.businesswire.com/news/home/20150115005322/en/Global-VoIP-Services-Market-Worth-US136.76-Billion (last visited Jan. 25, 2016).

[552] Paul Nunal, *Best Android Apps for VoIP and SIP Calls*, Android Authority (May 22, 2012), http://www.androidauthority.com/best-android-apps-VoIP-sip-calls-wi-fi-calling-Internet-calling-87396/.

example, the Google Hangouts Dialer (previously Google Voice) is available for download from the Google Play store and allows users to place calls over the internet.[553]

394.   ███
███
██ █ ██
███
█████ █ ██[556]

       7)   <u>Home entertainment</u>

       a)   <u>Blu-Ray</u>

395.   Oracle has historically licensed the Java platform for use in Blu-Ray technology. Blu-Ray is a successor to DVD technology with five times the storage capacity of a traditional DVD and simultaneously provides users with higher quality video.[557] In 2011, Blu-Ray sales rose 69% to $1.8 billion and the revenue from Blu-Ray discs increased 53% to $2.3 billion.[558]

396.   Java BDP, based off of Java ME, is the Java platform that is used for Blu-Ray. Java first emerged in Blu-Ray players in order to enhance menus and in-movie interactivity. Other potential applications for Java in Blu-Ray included gaming, new content downloading and online shopping.[559] In 2010, Oracle signed a $6.5 million license agreement with Sony for Java ME in Blu-ray players.[560] In 2013, 100% of Blu-Ray players shipped with Java.[561]

---

[553] Hangouts Dialer—Call Phones, Apps, Google Play, https://play.google.com/store/apps/details?id=com.google.android.apps.hangoutsdialer&hl=en.

[554] OAGOOGLE2000003423, at -3453.

[555] Deposition Transcript of Michael Ringhofer, Dec. 2 2015, p.127-129.

[556] Deposition Transcript of Michael Ringhofer, Dec. 2 2015, p.127-129.

[557] Blu-Ray Disk, Blu-ray, http://www.blu-ray.com/info (Last visited January 20, 2016); BD vs. DVD, Blu-ray, http://www.blu-raydisc.com/en/aboutblu-ray/whatisblu-raydisc/bdvs.dvd.aspx (last visited January 20, 2016).

[558] Ben Fritz, *Home Entertainment Market Shrinking Slows as Blu-ray and Digital Help Make Up for DVD Decline,* Los Angeles Times (January 6, 2011), http://latimesblogs.latimes.com/entertainmentnewsbuzz/2011/01/home-entertainment-market-shrinking-slower-as-blu-ray-and-digital-make-up-for-more-of-dvd-decline.html.

[559] Karlsson, Johan, *Blu-ray and Java,* Jayway (Dec. 11, 2009), http://www.jayway.com/2009/12/11/blu-ray-and-java/.

[560] OAGOOGLE0102403193, at -3216.

[561] Learn About Java Technology, Java, https://web.archive.org/web/20131130231244/http://java.com/en/about (Last visited January 20, 2016).

       178   Expert Report of Adam Jaffe

397.   In 2010, Google released its Google TV platform, a version of Android 2.1 that aimed to "expand beyond phones and tablets" into home entertainment devices.[562] This effort proved successful. In 2012 Sony announced the release of a Blu-Ray player powered by Google TV, the NSZ-GP9.[563] Google's entry into Google TV and its subsequent application to Sony's Blu-Ray player harmed Oracle's licensing relationship with Sony because it appropriated a licensing opportunity that could have potentially been captured by Oracle. It also provided a signal to the market that could impair Oracle's ability to license its Java platform to other Blu-Ray OEMs.

b)   Television and set-top boxes

398.   The competition between Oracle's Java TV (the Java applications platform for TVs) and Google TV that I observe with Blu-Ray players extends to connected televisions and TV set-top boxes. Java TV offers OEMs a ready application platform to exploit these new capabilities. Google competes with Oracle in this category through its Google TV platform, which is built upon Java-based Android

399.   Many new, high-end TVs and TV set-top boxes are Internet-enabled and license an application platform. Smart TVs gave viewers access to apps, the Internet, menus, and guides that were not available in the past. The value of the Smart TV market was $86 billion in 2010 and is projected to inc rease to $265 billion by the end of 2016.[564]

400.   ███

██████[5] Java TV allowed developers to create applications, games, bonus content, guides and other interfaces.[566] In 2006, David Reilly, a Sun Certified Java Programmer, wrote that the "Java TV API has the potential to revolutionize the Java landscape."[567] By 2014, 125 million TVs embodied Java TV.[568]

---

[562] Google TV, Android Central, http://www.androidcentral.com/google-tv (Last visited January 20, 2016).

[563] Matthew Moskovciak, *Sony Keeps Google TV Alive with New Blu-ray Player, Set Top Box,* CNet (Jan. 9, 2012), http://www.cnet.com/news/sony-keeps-google-tv-alive-with-new-blu-ray-player-set-top-box.

[564] Global Smart TV Market (2011 – 2016) Critical Capability, Use Case Analysis & Forecast By Accessories, Platforms, Middleware, Application & Geography, Markets and Markets (Jan. 2012), http://www marketsandmarkets.com/Market-Reports/smart-tv-market-455.html.

[565] OAGOOGLE2000034001.

[566] Java TV, Oracle, http://www.oracle.com/technetwork/java/embedded/javame/java-tv/overview/index.html (last visited January 20, 2016).

[567] David Reilly, Java Coming to a TV Near You!, Java Coffee Break (June 5, 2006), http://www.javacoffeebreak.com/articles/javatv.

[568] Learn About Java Technology, Java, https://web.archive.org/web/20141101234107/http://java.com/en/about (last visited January 20, 2016).

401.   As I discuss above, Google TV was released in 2010 as a platform for Blu-Ray players, as well as TVs. Google announced partnership with a series of OEMs, including Intel, Sony and Logitech.[569] In 2014, Google redubbed Google TV as "Android TV" and expanded its offering and the degree of competition with Java TV. Android TV is an extension of the Android mobile platform.[570] Android TV was released as a part of its Android 4.4 "Kit Kat" release.[571] Android TV now is licensed by Sony, Vision/Phillips and Sharp.[572]

402.   Oracle's Michael Ringhofer described ████████████████████████████
██
██
██."[573]

403.   Oracle faced similar harm from Android TV in the set-top box category. Alticast and Coship are two set-top box OEMs that originally licensed the Java platform. In both cases, Oracle faced competition from Google offerings and suffered losses of licensing revenue to Google. Contemporaneous documents describe this replacement with Alticast: "Alticast has indicated…that they have Android and HTML5 solutions ready for the market and are prepared to migrate their licensees to these solutions."[574] ████████
██
██
██████████████[575]

404.   These examples demonstrate that Google caused harm to Oracle's potential market for the Java platform in the TV and set-top box market.

---

[569] Industry Leaders Announce Open Platform to Bring Web to TV, Google, http://googlepress.blogspot.com/2010/05/industry-leaders-announce-open-platform.html (Last viewed January 20, 2016).

[570] Richard Lawler, Android TV will be in Sony, Sharp and Phillips Next Year, Engadget (June 25, 2014), http://www.engadget.com/2014/06/25/android-tv-is-coming-to-sony-sharp-and-philips-tvs-next-year.

[571] Richard Lawler, Android TV will be in Sony, Sharp and Phillips Next Year, Engadget (June 25, 2014), http://www.engadget.com/2014/06/25/android-tv-is-coming-to-sony-sharp-and-philips-tvs-next-year.

[572] Richard Lawler, Android TV will be in Sony, Sharp and Phillips Next Year, Engadget (June 25, 2014), http://www.engadget.com/2014/06/25/android-tv-is-coming-to-sony-sharp-and-philips-tvs-next-year.

[573] Michael Ringhofer Depo at p. 113-114.

[574] OAGOOGLE2000066068.

[575] OAGOOGLE2000077924.

HIGHLY CONFIDENTIAL –
ATTORNEYS' EYES ONLY   180   Expert Report of Adam Jaffe

c)   Gaming

405.   The gaming device category includes mobile applications and consoles. Sun was an early leader in licensing the Java platform for a variety of gaming environments and form factors. As with other device categories, Google has built off its Android mobile application platform (which copies the 37 Java API packages and substitutes for the Java platform as an applications platform across different kinds of devices) to enter gaming to compete and attempt to displace Java.

406.   In 2015, the total gaming market was estimated to reach $91.95 billion, of which $30.3 billion along comes from mobile games (another $26.4 billion is captured by consoles).[576]

407.   Java has a long history of enabling gaming. At the 2001 JavaOne Conference, gaming companies, Sega and Digital Bridges demonstrated games on Motorola phones that were running on the Java platform.[577] In 2003, Sun created the "Game Technologies Group" to develop Java technology for the gaming industry, specifically focused on the future of online games. At the time, Sun's Chief Gaming Officer, Chris Melissinos, reported that "there is no other company that can do it [allow developers to take advantage of multiple platforms at once] but Sun."[578]

408.   Java's early success in gaming continued through recent years, when Android sought to enter the gaming space via the Xbox gaming console. In 2012, Xbox announced the release of "SmartGlass," which allows Xbox users to enhance their experience by turning their mobile device into an additional screen or controller for gaming.[579] All mobile devices (tablets and phones) that operate on Android 4.0 or higher are compatible with Xbox SmartGlass.[580] In 2015, gaming company Razer announced that it was developing an Android-powered gaming console called the Razer Forge TV.[581] The Razer Forge TV also give users access to Google Play, where Android users can download apps.

---

[576] John Gaudiosi, *Mobile Game Revenues Set to Overtake Console Games in 2015,* Fortune (Jan. 15, 2015), http://fortune.com/2015/01/15/mobile-console-game-revenues-2015.

[577] Chris Wright, *A Brief History of Mobile Games: 2002 - Wake up and smell the coffee*, Pocket Gamer (Dec. 26, 2008), http://www.pocketgamer.biz/feature/10705/a-brief-history-of-mobile-games-2002-wake-up-and-smell-the-coffee.

[578] Janice Heiss, *Java Technology Gets in the Game: A Conversation with Chief Gaming Officer, Chris Melissinos,* Oracle (March 2004), http://www.oracle.com/technetwork/articles/java/games-137515.html.

[579] Casey Chan, *What is SmartGlass?,* GizModo (June 4, 2012), http://gizmodo.com/5915553/what-is-xbox-smartglass.

[580] Introducing Xbox SmartGlass, Xbox, http://www.xbox.com/en-US/smartglass (last viewed January 21, 2016).

[581] Ingrid Lunden, *Razer Unveils Its $100 Android-Powered Gaming Console, Razer Forge TV,* TechCrunch (Jan. 6, 2015), http://techcrunch.com/2015/01/06/razer-forge-nabu-x-osvr.

181   Expert Report of Adam Jaffe

409.   The gaming category – whether mobile or console – presents a very similar pattern to what I have observed in each of the device categories examined. Gaming exhibited early and continuous Java licensing in a growing and important category. In recent years, building off its mobile success, Android offers a competing application platform and begins to harm Oracle's Java platform offerings.

8)   GPS systems

410.   Global Positioning Systems (GPS) technology provides the backbone for an array of technologies that rely on mapping, movement tracking and other movement and location-based applications in the mobile space. The market for GPS is quite robust, with an estimated $26.4 billion in revenue this year.[582] As I have observed across each device category, Oracle has a history of licensing the Java platform to GPS devices. In recent years, Android has offered competing GPS application platform solutions that negatively impact the potential market for Oracle licensing because Java-based Android substitutes for the Java platform in this category.

411.   Java is used in many consumer GPS-enabled devices including Garmin. Garmin is a Java licensee and leading GPS device OEM. It "develops consumer, aviation, outdoor, fitness, and marine technologies" for GPS with products that include fitness-tracking watches[583] and GPS for cars.[584] Garmin's GPS Tool "is a Java Swing application that allows Garmin GPS users to connect their units to computers and use the Swing application as a tool for downloading and visualizing [GPS-enabled] waypoint, track, and route data on a global scale."[585]

412.   Android supports GPS-enabled devices that compete with Garmin's Java-licensed devices and applications, thereby harming Oracle's potential market. For example, there are many GPS-based applications developed for Android devices that are available for download on the Google Play store.[586] Sales of Garmin's most popular line of GPS devices — GPS for vehicle dashboards — fell by 6% in 2013 from the previous year as more drivers use smartphones (including Android) for their navigational

---

[582] Global GPS Market: Products (Marine, Aviation, Automotive, Outdoor/Fitness & GPS Enabled Smart Phones), Applications (Navigation, Machine Control & Logistics Tracking) & Geography (2011-2016), Markets and Markets, http://www marketsandmarkets.com/Market-Reports/global-GPS-market-and-its-applications-142 html (last visited Jan. 25, 2016).

[583] Running, Garmin, https://buy.garmin.com/en-US/US/into-sports/running/cIntoSports-cRunning-p1.html (last visited Jan. 25, 2016).

[584] Automotive, Garmin, www.garmin.com/en-US/explore/ontheroad (last visited Jan. 25, 2016).

[585] Garmin GPS Tool, SourceForge, http://sourceforge.net/projects/garmingpstool/ (last visited Jan. 25, 2006).

[586] *See, e.g.*, Joe Hindy, *13 Best GPS App and Navigation App Options for Android*, Android Authority (May 1, 2015), http://www.androidauthority.com/best-gps-app-and-navigation-app-for-android-357870/.

HIGHLY CONFIDENTIAL –
ATTORNEYS' EYES ONLY   182   Expert Report of Adam Jaffe

needs. [587] Given that Android platform GPS-enabled applications compete with Java-licensed GPS devices, I find that the Android platform's GPS applications cause harm to Oracle's potential market for GPS device licensing.

9)   Vending machines

413.   Throughout the early 2000s, technological advances influenced the vending machine industry in a significant way, from the goods that could be distributed via vending machine to the method by which customers could purchase these goods. Between 1999 and 2007, the volume of sales through vending machines in the United States increased from $36.6 billion to $47.5 billion, but decreased to $42.2 billion in 2010.[588] As technology has evolved, along with the ubiquity of credit cards and smartphones, vending machines have had to advance, as well. New vending machines, called smart vending machines, allow for this functionality. Frost & Sullivan, a market research firm, predicts there were 500,000 to 700,000 smart vending machines in 2012 and estimates there may be as many as 2 million by 2018.[589]

414.   As early as 1999, Java has been incorporated into vending machines, giving them the capability to be monitored and controlled via the internet.[590] The Java-controlled Pepsi Machine, for example, allowed users to pay using pre-paid cards that could be used at the vending machine, instead of dollar bills or coins. This technology also allowed types of available soda to be monitored; customers could see if the machine had what they wanted and the vending company could monitor to know when a refill is necessary.[591] One way that Java can be used in vending machines is through promotions or marketing campaigns. Some vending machines may have quiz questions or simple games, written in Java, which can result in a customer getting a good for free.[592]

---

[587] Jessica Leber, A Shrinking Garmin Navigates the Smartphones Storm, Technology Review (Mar. 8, 2013), http://www.technologyreview.com/news/511786/a-shrinking-garmin-navigates-the-smartphone-storm/.

[588] *Vending Machines - Total Sales Volume in the U.S. from 1999 to 2010 (in billion U.S. dollars),* Statista, http://www.statista.com/statistics/200646/total-sales-volume-of-vending-machines-in-the-us-since-1999 (last visited January 26, 2016).

[589] Olga Kharif, *Vending Machines Get Smart to Accommodate the Cashless,* Bloomberg Business (Aug. 29, 2013), http://www.bloomberg.com/bw/articles/2013-08-29/vending-machines-get-smart-to-accommodate-the-cashless.

[590] Yang-Byung Park, Jun-Su Yoo, *A heuristic for the inventory management of smart vending machine systems,* Omnia Science (Aug. 2012), http://www.jiem.org/index.php/jiem/article/viewFile/587/302.

[591] Webster, R.W., Ross, P.W., Bailey, T.M., Conrad, S.M., Fiorill, M.J., Flinchbaugh, J.M., & Velkly, E.A. (1999). *Controlling a Java Enabled Pepsi® Vending Machine Over the World Wide Web.* IECON Proceedings of the 25th Annual Conference of the IEEE, 1(29), 86–90.

[592] *Vendron Socket API (SDK),* Silkron, http://www.silkron.com/smart_vending_sdk (last visited January 26, 2016).

415.   In 2011, in China, Ubox created a vending machine app that allows users to make purchases from the machine with their mobile devices that are supported by iOS, Android or Java. The physical vending machine only had one button, and all other commands were performed from a mobile device. Mobile users also received a 10% discount on all vended products.[593]

416.   The positive licensing opportunity in vending machines coupled with the Android's platform efforts to supplant Java's historical and current licensing revenue provides evidence of harm to Oracle's potential market for vending machine device licensing.

10)   Printers

417.   The global printing hardware market was worth approximately $83 billion in 2015.[594] Java was licensed by printer hardware manufacturers including Canon, Fuji Xerox, Kyocera DS, and ▮▮▮▮.[595]

418.   In 2013, Google added a native printing feature to its Android v4.4 "KitKat" SDK, thus entering the market for printers.[596] Printer manufacturers such as Hewlett-Packard and Epson have supported native Android printing in their printers.[597] This has caused harm to Oracle's potential market for printers. For example, Oracle was working to license Java to ▮▮▮▮▮▮▮▮▮▮▮▮▮▮ ▮▮▮▮▮▮▮▮▮▮▮▮▮▮.[598] The Google Play store has a Lexmark printing application available for download to enable Android users to print directly from their phones to a Lexmark printer.[599]

419.   Accordingly, Android's entry into printers and competition for accounts like Lexmark has harmed the share of Java-licensed printers, and caused Oracle harm to its potential market in the printer device category.

---

[593] *Ubox Makes Mobile Vending Machines a Reality in China*, Retail Customer Experience (Sep. 5, 2011), http://www.retailcustomerexperience.com/news/ubox-makes-mobile-vending-machines-a-reality-in-china.

[594] Printing in the US: Market Research Report, IBISWorld (Dec. 2015), http://www.ibisworld.com/industry/default.aspx?indid=433.

[595] OAGOOGLE0100167800; *See also* OAGOOGLE2000003711; OAGOOGLE2000034001.

[596] James A. Martin, *Epson Printers Now Support Native Android Print on "KitKat" Devices*, CIO (May 19, 2014, 8:43am), http://www.cio.com/article/2369987/mobile-apps/epson-printers-now-support-native-android-print-on--kitkat--devices.html.

[597] James A. Martin, *Epson Printers Now Support Native Android Print on "KitKat" Devices*, CIO (May 19, 2014, 8:43am), http://www.cio.com/article/2369987/mobile-apps/epson-printers-now-support-native-android-print-on--kitkat--devices.html.

[598] Deposition Transcript of Donald Smith, Nov. 20, 2015, 121:3-6 ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮

[599] Lexmark Mobile Printing, Google Play, https://play.google.com/store/apps/details?id=com.lexmark.print&hl=en.

11)   Household appliances

420.   The market for household appliances in the U.S. alone includes over 3 million air conditioners and 50 million major household appliances were shipped annually, between 2005 and 2012.[600]

421.   Oracle was in negotiations with many appliances OEMs for licensing the Java platform. For example, Oracle was in discussions to ██ ████████████ █ ██ ████████████████████████ █

422.   The Android platform competes with Java to provide an application platform for household appliances devices. Android has been showcased on microwaves, refrigerators, air conditioners, ovens, washers, and dryers.[603] These appliances often connect to smartphones or access the Play Store, increasing Google's reach to appliances. Household appliances are a significant market opportunity and one in which Java has historically secured licensing revenue. The Android platform and apps in its Google Play Store are competitive to the Java platform and cause harm to Oracle's potential market in the household appliance device category.

12)   Cameras

423.   Even with the advent of smartphones with camera capabilities, digital cameras remain a material, if less popular, consumer electronic good.[604]

424.   ██.[605]

In 2014, Samsung and Nikon, major players in the camera market, launched models of digital cameras running Android. These digital cameras have WI-FI capabilities and access to Google Play Store and

---

[600] *Total Unit Shipments of Major Kitchen and Laundry Appliances* in the U.S. from 2005 to 2017 (in million units)*, Statista, http://www.statista.com/statistics/220086/unit-shipments-of-major-kitchen-and-laundry-appliances-in-the-us (last visited: February 5, 2016); *Air Conditioners Shipments in the U.S. from 2001 to 2014 (in millions)*, Statista, http://www.statista.com/statistics/220357/manufactured-shipments-of-unitary-air-conditioners (last visited February 5,2016).

[601] Deposition Transcript of Donald Smith, Nov. 20, 2015, 88: 17-23; *Products,* NXP, http://www nxp.com/products/products:PCPRODCAT (last visited February 5, 2016).

[602] OAGOOGLE2000062898 at 2899. OAGOOGLE2000128379 at 8380. OAGOOGLE2000023783.

[603] Sascha Segan, *Android Appliances at CES 2013*, January 11, 2013 (http://www.pcmag.com/article2/0,2817,2414179,00.asp), accessed January 27, 2016; GOOG-00387521.

[604] *Global sales of digital cameras by selected region in 2009 and 2010 (in million units)*, Statista, http://www.statista.com/statistics/270014/global-sales-of-digital-cameras-by-selected-region/.

[605] Deposition of Donald Smith, (Nov. 20, 2015), at pg. 166-67

Expert Report of Adam Jaffe

social media applications. The Nikon Coolpix S810c, with a price tag of $349.95, was Nikon's second attempt at an Android based camera.

425.   Oracle faced direct competition from Android for licensing Java in the camera market. One example of this is a lost deal with Nikon, a popular camera manufacturer. Meeting minutes from an Oracle meeting with Nikon confirm Oracle's efforts to negotiate and enter a Java platform license with Nikon for cameras. While Nikon seems to understand the value in Java, "Good thing is Hamaura-san [Nikon] understands Java is better than Android, considering performance, reliability, number of libraries, asset portability, etc." but they are releasing a model with Android "just because Android is one trend".[606] Finally, Oracle's Gen Shimada summarizes the meeting as, "Java is not used in Digital Camera today. But Nikon released one model based on Android the other day. But we hope to let them use Java."[607]

426.   The lost Nikon license is one example of potential harm to Oracle in the camera market due to Google's copying of the Java API packages in Android. On this basis, and as a result of the general competition presented to the Java platform for cameras by the Android platform, I find that Oracle's potential market for camera devices has been harmed by Google's Java-based Android platform.

13)   Payment terminals and point of sale systems

427.   Point of sale terminals are payment terminals that accept some form of electronic payment such as credit cards. Every store that accepts credit cards requires a point of sale terminal. The point of sale market was over $36 billion dollars in 2013.[608]

428.   Java was well poised to enter this market. A committee, including retailers like JCPenney and The Home Depot, was formed to standardize Java on point of sale terminals in 1997.[609] Now, Android is ubiquitous in the point of sale systems market, enabling many apps to replace the traditional point of sale terminals.[610]

---

[606] OAGOOGLE2000059827.

[607] OAGOOGLE2000059827.

[608] *Point-of-Sale Terminals Market to Log 11.6% CAGR to 2020; Mobile POS Terminals to Show Stellar Growth: Transparency Market Research* (http://www.prnewswire.com/news-releases/point-of-sale-terminals-market-to-log-116-cagr-to-2020-mobile-pos-terminals-to-show-stellar-growth-transparency-market-research-522400211.html), Accessed January 27, 2016.

[609] Rick Cook, Java jazzes point of sale systems with new APIs, (http://www.javaworld.com/article/2071277/java-se/java-jazzes-point-of-sale-systems-with-new-apis.html) Accessed January 27, 2016.

[610] Samples of those apps are found at http://www.posandro.com/, http://www.prweb.com/releases/accupos-point-of-sale/android-point-of-sale-pos/prweb9308542.htm, https://www.srpointofsale.com/products/hardware/, and other websites.

429.   Recently, Coca Cola's North American vendors have begun installing their machines with Android Pay; Coca Cola has announced that it will have 100,000 machines enabled with this technology by the end of 2015. Google's Director of Business Development, Spencer Spinnell announced that this brings the total count of merchants that allow customers to use Android Pay to over 700,000 in the United States. Derek Myers, of Google, believes that even though mobile payments are only responsible for a small percentage of Coca Cola's revenues currently, he expects a 20% increase by 2020.[611]

430.   While the market has shifted to mobile systems based on Android and iOS, Java being pushed out of the mobile space has caused it to lose in the point of sale market as well. I find, then, that the prevalence of the Android platform in payment and point of sale markets competing with the Java platform results in harm to Oracle's potential market in this device category.

C.   Widespread use

431.   In Section VI, I describe the importance of intellectual property and copyright protection. Particularly, I outline the well-accepted principle that protection of copyrighted creative works is required to both incentivize innovation and ensure the efficient distribution and consumption of copyrighted works. I further understand Factor 4 of the fair use analysis asks us to consider what would be the impact upon both the Java platform and its derivatives if the copying in this matter were to become widespread.[612]

432.   In this section, I have outlined many significant harms already suffered by Oracle from Google's unlicensed copying of the Java API packages. I further have described the potential market harm to Oracle across approximately 16 product markets in which Oracle monetizes its Java platform. This case may be unique in that Google's copying is already remarkably widespread because of the reach and ambition of Google. Google has ported its copying throughout Java's vast ecosystem and looks to harm Oracle's prospects in all 16 product markets, most notably through the reduction of Oracle's mobile phone monetization prospects.

433.   That being said, applying the widespread use test to this analysis would increase the market harm to Oracle. It would invite all who currently license the Java platform to copy the Java API packages without remuneration. For example, the economic incentives of current and significant Oracle customers such as Microsoft and Amazon to continue paying for a commercial Java license would be removed.

---

[611] Jay Moye, *Android Pay, Coca-Cola Vending Machines Link Payment and Loyalty,* Coca Cola (May 28, 2015), http://www.coca-colacompany.com/stories/android-pay-coca-cola-vending-machines-link-payment-and-loyalty.

[612] *See, e.g.*, Sony Corp. v. Universal City Studios, Inc., 464 U.S. 417, 450 (1984).

                                                           Expert Report of Adam Jaffe

Further, the impediments that the Java sales team has run up against in competing with Java-based Android would be even more pronounced, across more product categories, further exacerbating the harm.

434.   Unauthorized widespread copying of a creative work also makes it difficult to conceive of a situation in which the incentive to invest in such creative work would not be dramatically reduced, or removed entirely.

435.   Thus, unauthorized widespread use would not only create greater harm to Oracle, it could reduce the overall benefits to the technology community. Furthermore, given the wide-ranging adoption of Java-enabled products, impeded advancement of the Java platform would have ripple effects on users worldwide.

D.   Response to Dr. Astrachan's Factor 4 analysis

436.   I conclude that based on the substantial and wide-ranging harm to the markets for licensed Java, Google's copying of the Java API packages is not a fair use under Factor 4. Dr. Astrachan's analysis of the effect of the use on the potential market for Java API packages lacks any economic basis or analysis. I describe and respond to each of his arguments in turn below.

1)   Market substitution

437.   Dr. Astrachan states, "Android is not a substitute for Java SE because that Java platform targets a substantially different market." Dr. Astrachan's provides no discussion of what the different markets are, nor does he describe why the markets are different. Furthermore, he provides no economic rationale for a question that is fundamentally economic in nature. I have discussed above the many reasons why, from an economic perspective, Google's use supersedes licensed Java's use, thereby causing significant harm to the market for the Java platform. (See Section IX above).

2)   Impact of OpenJDK

438.   Dr. Astrachan contends that any harm to the market for the Java API packages "would have come about as a result of Sun/Oracle's own actions." Dr. Astrachan goes on to describe that Sun created an open-source version of Java SE in 2007. He then describes the recent announcement by Google of its intention to use the OpenJDK versions of the 37 API packages, and finally asserts, "Although Google did not take the OpenJDK license until 2015, there is no technical reason it could not have done so in the 2007/2008 timeframe as well."[613] I observe that Dr. Astrachan bounds his opinion to the technical

---

[613] Opening Expert Report of Dr. Owen Astrachan on Technical Issues Relating to Fair Use, January 8, 2016. P. 106-107.

viability of OpenJDK. I understand Oracle's technical expert, Professor Doug Schmidt will respond from a technical perspective, which is beyond my area of expertise. I will however discuss the economic ramifications of Dr. Astrachan's proposed counterfactual scenario, and explain why the use of OpenJDK would have likely been unacceptable to a company's in Google's position in 2007/2008 when it was developing and launching Android.

439.   In this section I analyze from an economic perspective the commercial reasonableness of OpenJDK to Google at the time of Android's development and launch. First, I consider Google's actual behavior, which was to intentionally *reject* the use of OpenJDK in 2007, 2008, and each of the years since. Assuming Google seeks to maximize long-term profits, this suggests that OpenJDK was not, and has not been, an economically favorable choice for Google. Second, I consider the impact that eight years of unlicensed use of the Java API packages has had on Google's competitive position in the mobile ecosystem. I find that Google is in a significantly stronger position today than it was in 2007. Google no longer desperately needs to build a mobile platform within a critical time window. Instead Google's need to forge partnerships with OEMs, carriers, and a developer community has been replaced by market dominance, ecosystem control, and huge profits.

<div align="center">

a)   Google's actual behavior
</div>

440.   The simplest evidence that OpenJDK was not a commercially reasonable option for Google is the fact that Google did not use it. As an economist, I think about the decisions companies make in light of the alternatives they are considering. In 2007, when Google made the choice to commercially release Android, OpenJDK had been announced as an available option. Google did not choose to use OpenJDK for Android, which means they viewed the alternative, copying the Java API packages without a license, to be more economically beneficial. As time went on and Google was faced with litigation over its use of the Java API packages, it still chose to not use OpenJDK. In May 2012, a jury found that Google infringed Oracle's copyrights in the Java platform. In May 2014, the Federal Circuit reinstated the jury's verdict and ruled that Google had copied the Java API packages without a necessary license. Since that ruling, Google has continued to exploit the Java API packages in its Android platform without abatement or recognition of the Federal Circuit's ruling.[614] Even after these rulings, Google failed to use OpenJDK.

---

[614] As opposed to Google's copying, Sun and Oracle have a long history of partners accepting licenses for commercial purposes, as I describe throughout this report. In other instances where firms have failed to comply with the Java platform's licensing requirements, Sun and Oracle have enforced their rights, as was the case with Microsoft and its unlicensed use of the Java platform. See, Sun Microsystems, Inc. v. Microsoft Corporation, U.S. District Court, Northern District of California, San Jose, Case Number 97-CV-20884.

189   Expert Report of Adam Jaffe

This again suggests that Google viewed there to be significant costs or potential downsides to using OpenJDK. And that OpenJDK was not a commercially reasonable option for Google.[615]

<div align="center">

b)   Google's position: then versus now

</div>

441.   By limiting his opinion to technical feasibility (which I understand is addressed by Professor Schmidt in his report), Dr. Astrachan fails to address essential competitive and economic context and evidence. As described above, the timing of Google's entry into the mobile application platform market was critical. Google faced a paradigm shift in user behavior that threatened the very core of its highly profitable search advertising revenue model and intense time-pressure to secure share in a market against formidable competitors old and new. Google's ability to defend its search business and control its mobile destiny depended on its ability to attract OEMs, carriers, and a developer community. Google's place in the ecosystem is dramatically different today. Put simply, it is nonsensical to compare Google's choice to copy instead of using OpenJDK in such starkly different competitive and market contexts. Recall from my discussion above the structure of Android's Purchase Agreement, the Android Inc. team was expressly incentivized to secure a partnership with a wireless carrier quickly.[616]

442.   I understand from Ms. Murray that there are significant downstream implications of using GPLv2 (whether or not with the Classpath Exception) code. Specifically, it is my understanding that GPLv2 code "infects" software that incorporates GPLv2 code, and impacts the downstream user's ability to keep additional code proprietary. Google's initial strategy of building a hardware-agnostic mobile application platform dictated cooperation with a number of different mobile device manufacturers and carriers. I understand that Ms. Murray's report states that these key partners would have been forced to face the undesirable business risk of subjecting proprietary source code to the open source requirements of the GPL-related licenses of the OpenJDK, thereby severely limiting OEM and carrier ability to differentiate. And Google apparently understood these risks, as discussed in Ms. Murray's report and further below.

443.   Additionally, I understand that regardless of the complicated legal and technical interpretations of GPLv2 (whether or not with the Classpath Exception), I understand that Ms. Murray found that as of 2007, key mobile partners on which Google depended were unlikely to use GPLv2 software because of negative perceptions. In economic terms, the probability of Google securing not one, but many working relationships with OEMs and carriers who were known to be averse to GPLv2 code (whether or not with the Classpath Exception), is very low.

---

[615] Indeed, internal Google documents reveal that Google very intentionally rejected the OpenJDK for use in Android. *See, e.g.*, TX 230 (dated Aug 11, 2007).

[616] GOOGLE-00303922, at -3929, -4000.

444.   Google understood this dynamic, as expressed in a May 2007 email from Andy Rubin to Google's Executive Management Group (EMG):

> We do not believe phones can be built using GPL software. OEMs and carriers need the ability to differentiate, and therefore cannot be required to open source their proprietary features (GPL's "copyleft" requires this). This is the trick Sun and other such as Real Networks use to lure licenses into a direct license (aka dual license). It is fraught with problems, such as requiring any community contributions to also be dual licensed. That means community development is monetized by Sun![617]

A few months later, Rubin again articulated the concern with GPL and participation from OEMs and carriers, in an email to other Android leads:

> The problem with GPL in embedded systems is that it's viral, and there is no way (for example) for OEMs or Carriers to differentiate by adding proprietary works. We are building a platform where the entire purpose is to let people differentiate on top of it. [618]

Similarly, in his deposition Rubin stated that GPL-related was unattractive to platform developers, using game developers as an example:

> So anybody that puts software on top of GPL, for example, if Electronic Arts writes a game on top of a cell phone that has a GPL, in it, that forces Electronic Arts to Open Source their game, which obviously, you know, they can't do because they're a business.[619]

445.   These statements from Google – made at the time it was actually making the decision to reject using OpenJDK in Android – show that using the open-source Java platform was untenable. This comports with Ms. Murray's opinions which explain the general industry environment and resistance among mobile industry participants to GPL-related licensing.   Instead, Google chose to copy the Java API packages and cemented its cooperation with critical partners, securing scale and control in the emerging mobile market before its short window of opportunity closed.

446.   Today Google sits in a very different position. Google's unlicensed use of the Java API packages for the past eight years has significantly altered Google's bargaining power vis-a-vis its industry partners. Google has substantially greater bargaining power with OEMs, carriers, and developers because of its scale (80%+ market share in terms of shipments). Further, Google has significant profits from Android

---

[617] GOOGLE-26-00005730.

[618] GOOGLE-02-00020474.

[619] Andrew Rubin Individual Deposition Transcript July 27, 2011, p. 14:1-5.

191   Expert Report of Adam Jaffe

with which it can incentivize partners through revenue share agreements. This is in stark contrast to Google's position in 2007, when it had zero share. Back then, Google needed urgently to forge relationships and build its presence in the mobile market before getting shut out by competitors such as Apple and Microsoft.

<div align="center">3)   Oracle's alleged tolerance of other unlicensed Java uses</div>

447.   Astrachan suggests that other unlicensed implementations of Java, and Oracle's tolerance of them, should make Google's copying fair use (paragraphs 275-280). As discussed above, it is common practice for intellectual property owners to allow free or unlicensed use of their property under some circumstances but not others. The examples cited by Dr, Astrachan (OpenJDK, GNU Classpath and Apache Harmony) do not involve circumstances where the Java API packages were incorporated into a device for widespread commercial distribution. As discussed above, OpenJDK and GNU Classpath have specific restrictions that are generally unattractive to commercial device manufacturers. Dr. Astrachan's discussion of Apache Harmony and characterization of it as an authorized use is misleading; indeed the Court previously rejected Google's implied license defense.[620] Nor is Apache Harmony licensed because it did not pass the TCK and was not given a license to the necessary TCK[621] in a highly publicized dispute with Sun.[622] Dr. Astrachan quotes as a source an excerpt from a news article which reads: "May 9, 2007 article quoting Sun CEO Jonathan Schwartz saying "there is no reason that Apache cannot ship Harmony today. . . ."[623] Dr. Astrachan does not include the following sentence from the same article, which reads, "That is technically true, but Apache officials said that to do so with the TCK restrictions in place would actually go against the Apache Software license."[624] More importantly, Dr. Astrachan ignores the very public dispute between Apache Harmony and Sun over Apache's use of the Java platform. In April 2007, the Apache Software Foundation proclaimed in an "Open Letter to Sun" its strong disagreement with Sun's licensing terms, describing the terms as "unaccepatable."[625] The dispute culminated in the Apache Software Foundation's resignation from the Java Community Process board in November 2010.[626] The

---

[620] ECF No. 1203 (Order on Equitable Defenses)

[621] See http://docs.oracle.com/javase/1.5.0/docs/relnotes/license.html

[622] TX 917, TX 1045.

[623] Opening Expert Report of Dr. Owen Astrachan, January 8, 2016, p. 112 footnote 24.

[624] TX 2341.

[625] *Open Letter to Sun Microsystems*, The Apache Software Foundation website, April 10, 2007, (http://www.apache.org/jcp/sunopenletter html); TX 0917.

[626] *The ASF Resigns From the JCP Executive Committee*, The Apache Software Foundation blog, December 9, 2010, (https://blogs.apache.org/foundation/entry/the_asf_resigns_from_the); TX 1045.

Apache Harmony project was retired within a year, as indicated below on the Apache Harmony website FAQ page, as shown below in Figure 73.

Figure 73: Apache Harmony Retirement Notice (2011)[627]

448.   These examples are thus red herrings. Google and its executives clearly understood the choice that they made, which was to decline to license Java for the Android application platform, and copy without a required license the Java API packages instead.

4)   Conclusion

449.   For the reasons described above, Google's public statements of its intent to use OpenJDK in the future do not alter in any way my findings that Oracle has suffered significant market harm from Google's conduct.

X.   CONCLUSION

450.   As I explain above, my analyses of the important economic considerations underlying Factors 1 and 4 reveal that Google's use of the Java API packages is highly commercial, not transformative, and resulted in significant market harm. From an economic perspective, this weighs squarely against a finding of fair use under Factors 1 and 4. As I mention above, I also understand the first and fourth factors are often considered to be the most significant of the fair use factors.

---

[627] *FAQ*, Apache Harmony website, November 16, 2011, (https://harmony.apache.org/faq html).

Oracle v. Google

Exhibit 1: Quarterly Worldwide Smartphone Unit Sales to End Users by Platform in 2011 and 2015

		[A]	[B]	[C]	[D]	[E]	[F]	[G]
		Windows CE	**Palm OS**	**RIM***	**Symbian**	**iPhone**	**Android**	**Other**
[1]	**2011Q1**	3,658,700	-	13,004,000	27,598,500	16,883,200	36,267,800	3,357,200
[2]	**2011Q2**	1,723,800	-	12,652,300	23,853,200	19,628,800	46,775,900	3,106,400
[3]	**2011Q3**	1,701,900	-	12,701,100	19,500,100	17,295,300	60,490,400	3,496,600
[4]	**2011Q4**	2,759,000	-	13,184,500	17,458,400	35,456,000	75,906,100	4,277,800
[5]	**2015Q1**	8,271,000	-	1,325,000	-	60,177,000	265,012,000	1,268,700
[6]	**2015Q2**	8,198,000	-	1,153,000	-	48,086,000	271,010,000	1,229,000
[7]	**2015Q3**	5,874,000	-	977,000	-	46,062,000	298,797,000	1,133,600

Sources:

[1][A] - [1][G]   Jared Newman, Gartner: Android Dominates Smartphone Sales Worldwide,
PCWorld, http://www.pcworld.com/article/228218/Gartner_Android_Dominates_Smartphone_Sales_Worldwide.html, Table 2.

[2][A] - [2][G]   Jenny Williams, Worldwide smartphone sales grow 74% in second quarter of 2011, says Gartner, Computer Weekly (Aug. 11, 2011),
http://www.computerweekly.com/news/2240105329/Worldwide-smartphone-sales-grow-74-in-second-quarter-of-2011-says-Gartner

[3][A] - [3][G]   Tom Warren, Gartner: Windows Phone sales flat in Q3 2011, WinRumors (Nov. 15, 2011),
http://www.winrumors.com/gartner-windows-phone-sales-flat-in-q3-2011/.

[5][A] - [5][G]   Gartner Says Worldwide Smartphone Sales Soared in Fourth Quarter of 2011 With 47 Percent Growth, Gartner (Feb. 15, 2012),
http://www.gartner.com/newsroom/id/1924314, Table 3.

[6][A] - [6][G]   Gartner Says Emerging Markets Drove Worldwide Smartphone Sales to 19 Percent Growth in First Quarter of 2015, Gartner (May 27, 2015),
http://www.gartner.com/newsroom/id/3061917, Table 2.

[7][A] - [7][G]   Gartner Says Worldwide Smartphone Sales Recorded Slowest Growth Rate Since 2013, Gartner (Aug. 20, 2015),
http://www.gartner.com/newsroom/id/3115517, Table 2.

[8][A] - [8][G]   Gartner Says Emerging Markets Drove Worldwide Smartphone Sales to 15.5 Percent Growth in Third Quarter of 2015, Gartner
(Nov. 18, 2015), http://www.gartner.com/newsroom/id/3169417, Table 2.

*RIM licensee from 2004-2011: OAGOOGLE2009765798; OAGOOGLE0100167800

Oracle v. Google

Exhibit 2: Annual Worldwide Smartphone Unit Sales to End Users by Platform

		[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
		Windows CE	**Palm OS**	**RIM***	**Symbian***	**iPhone**	**Android**	**Other**	**Total**
[1]	**2007**	14,698,000	1,762,700	11,767,700	77,684,000	3,302,600	-	13,100,700	122,315,700
[2]	**2008**	16,498,100	2,507,200	23,149,000	72,933,500	11,417,500	-	12,782,600	139,287,900
[3]	**2009**	15,031,000	-	34,346,600	80,878,300	24,889,700	6,798,400	10,432,100	172,376,100
[4]	**2010**	12,378,200	-	47,451,600	111,576,700	46,598,300	67,224,500	11,417,400	296,646,700
[5]	**2011**	9,843,400	-	51,541,900	88,410,200	89,263,300	219,440,200	14,238,000	472,737,000
[6]	**2012**	16,940,700	-	34,210,300	-	130,133,200	451,621,000	47,203,000	680,108,200
[7]	**2013**	30,714,000	-	18,606,000	-	150,786,000	761,288,000	8,327,000	969,721,000
[8]	**2014**	35,133,000	-	7,911,000	-	191,426,000	1,004,675,000	5,745,000	1,244,890,000
[9]	**2015**	28,217,000	-	4,432,000	-	200,387,000	1,133,616,000	4,764,900	1,371,416,900

Sources:

[1][A] - [2][G]: Gartner Says Worldwide Smartphone Sales Reached Its Lowest Growth Rate With 3.7 Percent Increase in Fourth Quarter of 2008,

Gartner (Mar. 11 2009), http://www.gartner.com/newsroom/id/910112, Table 3.

[3][A] - [4][G]: Lance Whitney, Gartner: Android ranks 2nd in global smartphones, CNET (Feb. 9, 2011),

http://www.cnet.com/news/gartner-android-ranks-2nd-in-global-smartphones, Table 4.

[5][A] - [5][G]: Exhibit 1, Sum [1][A] - [4][G]

[6][A] - [7][G]: Gartner Says Annual Smartphone Sales Surpassed Sales of Feature Phones for the First Time in 2013, Gartner (Feb. 13 2014),

http://www.gartner.com/newsroom/id/2665715, Table 3

[8][A] - [8][G]: Gartner Says Smartphone Sales Surpassed One Billion Units in 2014, Gartner (Mar. 3, 2015), http://www.gartner.com/newsroom/id/2996817, Table 3.

[9][A] - [9][G]: Exhibit 1, Sum [5][A] - [7][G], with Q3 counted twice, in order to approximate Q4

[1][H] - [9][H]: Sum [1][A] - [9][G]

*RIM and Symbian are Java Licensees

RIM licensee from 2004-2011: OAGOOGLE2009765798; OAGOOGLE0100167800

Symbian licensee from 2004-2008: OAGOOGLE0100167800

Oracle v. Google

Exhibit 3: Worldwide Android and Java-Based Smartphone Share

		[A]	[B]	[C]	[D]
		Android	**Java**	**Android share**	**Java share**
[1]	**2007**	-	89,451,700	0.0%	73.1%
[2]	**2008**	-	96,082,500	0.0%	69.0%
[3]	**2009**	6,798,400	115,224,900	3.9%	66.8%
[4]	**2010**	67,224,500	159,028,300	22.7%	53.6%
[5]	**2011**	219,440,200	139,952,100	46.4%	29.6%
[6]	**2012**	451,621,000	34,210,300	66.4%	5.0%
[7]	**2013**	761,288,000	18,606,000	78.5%	1.9%
[8]	**2014**	1,004,675,000	7,911,000	80.7%	0.6%
[9]	**2015**	1,133,616,000	4,432,000	82.7%	0.3%

Sources:

[1][A] - [9][↲ [1][A] - [9][A]: Exhibit 2 [1][F] - [9][F]

[1][B] - [9][B]: Exhibit 2 [1][C] - [9][C] + [1][D] - [9][D]

[1][C] - [9][C]: ([1][A] - [9][A]) / (Exhibit 2 [1][H] - [9][H])

[1][D] - [9][D]: ([1][B] - [9][B]) / (Exhibit 2 [1][H] - [9][H])

Exhibit 4: Percentage of US Households with Internet

	1993	1994	1995	1996	1997	1998*	1999	2000	2001	2002	2003	2004	2005	2006
Percentage with Internet	-	-	-	-	18%	22%	26%	42%	51%	52%	55%	56%	58%	60%

Source:

ITU World Telecommunication/ICT Indicators database, 2015.

*1998: Interpolated

Oracle v. Google

Exhibit 5: Google Worldwide Revenue, in millions

	[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]	[I]	[J]	[K]	[L]	[M]	[N]
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
[1] **Total Advertising Revenue**	$411	$1,421	$3,143	$6,065	$10,493	$16,413	$21,129	$22,889	$28,236	$36,531	$43,686	$50,578	$59,056	$67,390
[2] **Licensing and Other Revenues**	$29	$45	$46	$74	$112	$181	$667	$762	$1,085	$1,374	$2,353	$4,972	$6,945	$7,151
[3] **Total**	$440	$1,466	$3,189	$6,139	$10,605	$16,594	$21,796	$23,651	$29,321	$37,905	$46,039	$55,550	$66,001	$74,541

Sources:

[1][A] - [2][C]: Google 2004 10K. Page 25. Licensing and Other Revenues consist of

"revenues from the license of our web search technology, the license of our search solutions to enterprises and the sale and license of other products

[1][D] - [2][F]: Google 2007 10K, Page 37. Licensing and Other Revenues consist of

"revenues from the license of our web search technology, the license of our search solutions to enterprises and the sale and license of other products

[1][G] - [2][I]: Google 2010 10K, Page 29. In the 2010 and subsequent 10K filings, Licensing and Other Revenues is listed as Other revenues, and the

categories are no longer enumerated.

[1][J] - [2][L]: Google 2013 10K, Page 27.

[1][M] - [2][M]: Google 2014 10K, Page 23.

[1][N] - [2][N]: Alphabet 2015 10K, Page 12.

[1][O] - [2][O]: Google 2015 Q3 10-Q, Page 33, this table contains Q1-Q3.

[1][P] - [2][P]: Google 2015 Earnings Announcement (https://abc xyz/investor/news/earnings/2015/Q4_google_earnings/index.html),

 retrieved February 3, 2016.

[3]: [1] + [2]

Oracle v. Google

Exhibit 6: Java ME Billings, 2005 to 2010

Source:
OAGOOGLE000062097 at Page 4.

Oracle v. Google

Exhibit 7: Worldwide Mobile Cellular Subscriptions

Year	Mobile Cellular Subscriptoins World-Wide	Year	Mobile Cellular Subscriptoins World-Wide
1980	23,482	**1998**	318,094,174
1981	63,585	**1999**	490,979,600
1982	101,509	**2000**	738,151,139
1983	148,855	**2001**	960,971,700
1984	319,252	**2002**	1,164,248,294
1985	750,629	**2003**	1,414,992,537
1986	1,450,136	**2004**	1,760,951,960
1987	2,545,270	**2005**	2,205,267,896
1988	4,327,956	**2006**	2,744,574,819
1989	7,353,071	**2007**	3,368,126,869
1990	11,210,115	**2008**	4,028,070,041
1991	16,276,503	**2009**	4,635,598,795
1992	23,245,154	**2010**	5,297,769,999
1993	34,163,332	**2011**	5,893,428,091
1994	55,511,190	**2012**	6,265,132,850
1995	90,742,447	**2013**	6,665,937,272
1996	145,039,493	**2014**	6,965,109,443
1997	214,950,979		

Source:

Mobile Cellular Subscriptions , The World Bank,

Data provided within the "Data" tab of excel doc, World Data is available

Oracle v. Google

Exhibit 8 Google Revenues from Searches on Mobile Devices

[A] Month	[B] Android	[C] iOS	[D] Others
1/1/2008			
2/1/2008			
3/1/2008			
4/1/2008			
5/1/2008			
6/1/2008			
7/1/2008			
8/1/2008			
9/1/2008			
10/1/2008			
11/1/2008	$103,766		
12/1/2008	$527,792		
1/1/2009	$570,364		
2/1/2009	$700,217		
3/1/2009	$883,093		
4/1/2009	$783,501		
5/1/2009	$836,386		
6/1/2009	$751,288		
7/1/2009	$781,507		
8/1/2009	$879,543		
9/1/2009	$898,339		
10/1/2009	$1,048,181		
11/1/2009	$1,379,958		
12/1/2009	$1,959,042		
1/1/2010	$2,240,243		
2/1/2010	$2,477,357		
3/1/2010	$3,192,605		
4/1/2010	$3,524,381		
5/1/2010	$4,330,533		
6/1/2010	$5,279,993		
7/1/2010	$6,575,113		
8/1/2010	$7,598,277		
9/1/2010	$8,341,188		
10/1/2010	$10,111,321		
11/1/2010	$12,522,147		
12/1/2010	$15,539,596		
1/1/2011	$17,213,265		
2/1/2011	$19,179,406		
3/1/2011	$23,454,730		

Oracle v. Google

[A] Month	[B] Android	[C] iOS	[D] Others
4/1/2011	$25,107,704		
5/1/2011	$29,150,303		
6/1/2011	$31,919,712		
7/1/2011	$35,264,669		
8/1/2011	$40,657,386		
9/1/2011	$43,737,308		
10/1/2011	$48,732,245		
11/1/2011	$55,349,770		
12/1/2011	$68,115,556		
1/1/2012	$74,792,008		
2/1/2012	$76,976,758		
3/1/2012	$88,099,750		
4/1/2012	$87,866,757		
5/1/2012	$96,438,663		
6/1/2012	$100,853,891		
7/1/2012	$107,601,788		
8/1/2012	$115,563,339		
9/1/2012	$124,115,281		
10/1/2012	$128,566,016		
11/1/2012	$145,016,998		
12/1/2012	$158,825,925		
1/1/2013	■	■	■
2/1/2013	■	■	■
3/1/2013	■	■	■
4/1/2013	■	■	■
5/1/2013	■	■	■
6/1/2013	■	■	■
7/1/2013	■	■	■
8/1/2013	■	■	■
9/1/2013	■	■	■
10/1/2013	■	■	■
11/1/2013	■	■	■
12/1/2013	■	■	■
1/1/2014	■	■	■
2/1/2014	■	■	■
3/1/2014	■	■	■
4/1/2014	■	■	■
5/1/2014	■	■	■
6/1/2014	■	■	■
7/1/2014	■	■	■
8/1/2014	■	■	■
9/1/2014	■	■	■
10/1/2014	■	■	■
11/1/2014	■	■	■

Oracle v. Google

[A] Month	[B] Android	[C] iOS	[D] Others
12/1/2014	███████	███████	███████
1/1/2015	███████	███████	███████
2/1/2015	███████	███████	███████
3/1/2015	███████	███████	███████
4/1/2015	███████	███████	███████
5/1/2015	███████	███████	███████
6/1/2015	███████	███████	███████

Source:

GOOG-00022388

iOS Data available in [C]

Oracle v. Google

Exhibit 9: Android Revenues (in millions)

		[A]	[B]	[C]	[D]	[E]	[F]	[G]	[H]
		2008	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
[1]	**Ads***		$ 15.7	$ 120.1	$ 569.0	$ 2,152.4	$ ■	$ ■	■
[2]	**App Sales**		$ 1.1	$ 8.0	$ 36.2	$ 136.1	$	$	$
[3]	**Direct to Consumer**		$ -	$ 115.2					
[4]	**Hardware**				$ -	$ 303.5	$	$	$
[5]	**Digital Content**				$ 14.8	$ 105.8	$	$	$
[6]	**Total**	$ 0.70	$ 16.8	$ 243.4	$ 620.0	$ 2,697.8	$	$	$

Sources:
[6][A]: GOOGLE-00303725
[1][B] - [3][B] & [6][B]: GOOGLE-01-00053552
[1][C] - [3][C] & [6][C]: GOOGLE-77-00053555
[1] [D]: GOOG-00134535
[2][D] & [4][D] - [5][D]: GOOG-00103813
[2][E] & [4][E] - [5][E]: GOOG-00103813
[2][F] & [4][F] - [5][F]: GOOG-00103813
[2][G] & [4][G] - [5][G]: GOOG-00103813
[2][H] & [4][H] - [5][H]: GOOG-00103813
[1][E], [1][F], [1][G]: GOOG-00022386
[1][G]: GOOGLE-77-00053555 *Google forecasted ad revenue for 2011
[1][H]: GOOG-00022386 **Q1+Q2 doubled to estimate total 2015 Android Ad Revenue
[6][D], [6][E], [6][F], [6][G], [6][H]: Calculated by summing rows 1-5
***: Ads include Search, AdSense, and Display

Oracle v. Google

Exhibit 10: Developer Mindshare (Percent of Developers Writing Apps for Each Platform)

		[A] 2010	[B] 2011	[C] 2012	[D] 2013Q1	[E] 2013Q3	[F] 2013	[G] 2014
[1]	**Android**	59%	67%	76%	72%	71%	72%	71%
[2]	**Java ME**	50%	46%	35%	16%	13%	15%	10%

Sources:

[1][A], [1][B]: Developer Economics 2011, p.16

[2][A], [2][B]: Developer Economics 2011, p.16

[1][C], [2][C]: Develoepr Economics 2012   *available at:*

http://www.statista.com/chart/424/app-developers-increasingly-focus-on-android-and-ios/

[1][D] - [2][D] , [1][E] - [2][E], [1][G] - [2][G]: Developer Economics Q1 2014, State of the Developer Nation, p.16

[1][G]: Developer Economics Q1 2014 pp. 2

[F]: Average of [D] and [E]

*Developers were permitted to choose more than one platform

Oracle v. Google

Exhibit 11: Google TAC payments to "Partner A"

Source: Docket 1436
[A] - [E]: Native

Calculations:
[F]: [B] * [D]
[G]: [C] * [E]

Oracle v. Google

Exhibit 12: Google TAC payments to "Partner B"

Source: Docket 1436
[A] - [C]: Native

Calculations:
[D]: [B] * [C]

Oracle v. Google

Exhibit 13: Google TAC payments to "Partner C"

Source: Docket 1436
[A] - [C]: Native

Calculations:
[D]: [B] * [C]

Oracle v. Google

Exhibit 14: Google TAC payments to "Partner D"

Source: Docket 1436
[A] - [C]: Native

Calculations:
[D]: [B] * [C]

Oracle v. Google

Exhibit 15: Google TAC payments to "Partner E"

Source: Docket 1436
[A] - [C]: Native

Calculations:
[D]: [B] * [C]

Oracle v. Google

Exhibit 16: Google TAC payments to "Partner F"

Source: Docket 1436
[A] - [C]: Native

Calculations:
[D]: [B] * [C]

Oracle v. Google

Exhibit 17: Worldwide sales of Android phones and shipments of Android tablets

		[A] 2009	[B] 2010	[C] 2011	[D] 2012	[E] 2013	[F] 2014	[G] 2015
[1]	**Phones**	6,798,400	67,224,500	219,440,200	451,621,000	761,288,000	1,004,675,000	1,133,616,000
[2]	**Tablets**	-	4,400,000	26,533,333	74,000,000	142,133,333	165,600,000	139,800,000

Sources:

[1][A] - [1][B]: Gartner: Android ranks 2nd in global smartphones, Gartner (February 9, 2011),

http://www.cnet.com/news/gartner-android-ranks-2nd-in-global-smartphones/.

[1][C]: Exhibit 1, Sum [1][F] - [4][F]

[1][D]: Gartner Says Annual Smartphone Sales Surpassed Sales of Feature Phones for the First Time in 2013, Gartner

(Feb. 13 2014), http://www.gartner.com/newsroom/id/2665715, Table 3

[1][E] - [1][F]: Gartner Says Smartphone Sales Surpassed One Billion Units in 2014, Gartner (Mar. 3, 2015),

http://www.gartner.com/newsroom/id/2996817, Table 3.

[1][G]: Exhibit 1, Sum [5][A] - [7][G], with Q3 counted twice, in order to approximate Q4

[2][B] - [2][F]: Global Tablet Shipments by Operating System Per Quarter 2010-2015, Statista,

http://www.statista.com/statistics/273268/worldwide-tablet-sales-by-operating-system-since-2nd-quarter-2010/, accessed

 February 8, 2016. Data for 2010 Q1, 2011 Q1, and 2013 Q3 are unavailable, those quarters are interpolated based on those years.

[2][G]: Worldwide Tablet Shipments Expected to Decline -8.0% in 2015 while 2-in-1 Devices Pick Up Momentum, Growing 86.5%

 IDC (Aug. 26, 2015), http://www.idc.com/getdoc.jsp?containerId=prUS25867215. This is a forecast for 2015.

Exhibit 18: Java Across Form Factors

Sources:

1) *THG Reporting Team, GM, Sun Agree to Make OnStar Java*, TOM'S HARDWARE (Oct. 17, 2000), http://www.tomshardware.co.uk/gm,news-2420 html; *2000 GM Yukon Denali,* Cars.com, http://www.cars.com/gmc/yukon/2000/snapshot (last visited February 5, 2016).

2) Stephen Shankland, Sun Puts Java into Gear for Cars (June 29, 2004), http://www.zdnet.com/article/sun-puts-java-into-gear-for-cars; *2002 5 Series Values*, Nada Guides, http://www nadaguides.com/Cars/2002/BMW/5-Series (last visited February 5, 2016).

3) *13 of The Longest Living Playstation 2 Multiplayer Games*, Game Skinny, http://www.gameskinny.com/jgupp/13-of-the-longest-living-playstation-2-multiplayer-games (last visited February 5, 2016); *Sony Computer Entertainment Integrates Java Capabilities Into PlayStation® 2,* Sony (June 4, 2001), http://www.sony.com/en_us/SCA/company-news/press-releases/sony-computer-entertainment-america-inc/2001/sony-computer-entertainment-integrates-java-capabi.html.

4) *Blackberry Bold Touch 9900 Pictures,* GSM Arena, http://www.gsmarena.com/blackberry_bold_touch_9900-pictures-3116.php (last visited February 5, 2016).

5) *BDP-S550 Blu-ray Player Price Comparison*, Blu Ray Player Price Comparison, http://www.bdp-s550.com/bdp-s550-blu-ray-player.shtml (last visited February 5, 2016).

6) Paul Krill, *Update: RIM Jumps into Tablet Game,* InfoWorld (Sep. 27, 2010), http://www.infoworld.com/article/2626372/application-development/update--rim-jumps-into-tablet-game.html; *Android App Player,* Crackberry, http://crackberry.com/tag/android-app-player (last visited February 6, 2016).

Exhibit 18: Java Across Form Factors (Continued)

7) *HP Mini 210-1010NR - 10.1" - Atom N450 - Windows 7 Starter - 1 GB RAM - 160 GB HDD*, http://www.cnet.com/products/hp-mini-210-1010nr-10-1-atom-n450-windows-7-starter-1-gb-ram-160-gb-hdd/specs (last visited February 6, 2016); *HP Mini 210-2090NR 10.1" Netbook Computer (Crimson Red)*, http://www.bhphotovideo.com/c/product/735600-REG/HP_Hewlett_Packard_XG714UA_ABA_Mini_210_2090NR_10_1_Netbook.html (last visited February 6, 2016) .

8) *Motorola XOOM MZ604*, http://www.gsmarena.com/motorola_xoom_mz604-3833.php (last visited February 6, 2016).

10) Device Magazine, http://www.devicemag.com/2011/12/14/apple-macbook-pro-new-line-up-sports-retina-display-screen-of-2880-x-1800-resolutions-coming-in-q2-2012 (last visited February 6, 2016); Java 20 Years, Oracle, http://oracle.com.edgesuite net/timeline/java/ (last visited February 6, 2016).

11) Computer Forum, http://www.computerforum.com/threads/is-the-dell-dimension-3000-an-atx.101437 (last visited February 6, 2016).

12) John Zukowski, *Think small: Java on Compaq's iPAQ*, JavaWorld (Oct. 26, 2001), http://www.javaworld.com/article/2075780/mobile-java/think-small--java-on-compaq-s-ipaq html.

13) *Virgin Mobile USA and Kyocera Wireless Debut the K10 Royale with Java Powered Games and Ringtones*, Kyocera (Apr. 5, 2005), http://americas kyocera.com/press-releases/press-releases_201503191202.htm; *K10 Royale User Guide*, Virgin Mobile USA, https://www.virginmobileusa.com/resources/phones/prepaid/manual/kyocera-k10.pdf (last visited February 6, 2016).

14) OAGOOGLE3000000021; *Palm-i705-OS-4-1-Touchscreen-Wireless-PDA-w-Memory-Card-Power-Supply*, ebay, http://www.ebay.com/itm/Palm-i705-OS-4-1-Touchscreen-Wireless-PDA-w-Memory-Card-Power-Supply-/321387285147 (last visited February 6, 2016).

15) *HP Palm Centro 690 Specifications*, UM Net, http://www.umnet.com/phone/1541-HP_Palm_Centro_690 (last visited February 6, 2016).

16) Chris Aniszczyk, *Symbian, Nokia and Java,* Chris Aniszczyk's Diatribe (Nov. 2, 2009), http://aniszczyk.org/2009/11/02/symbian-nokia-and-java; *Skype s60*, Symbian-Freeware, http://www.symbian-freeware.com/download-skype-s60.html (last visited February 6, 2016).
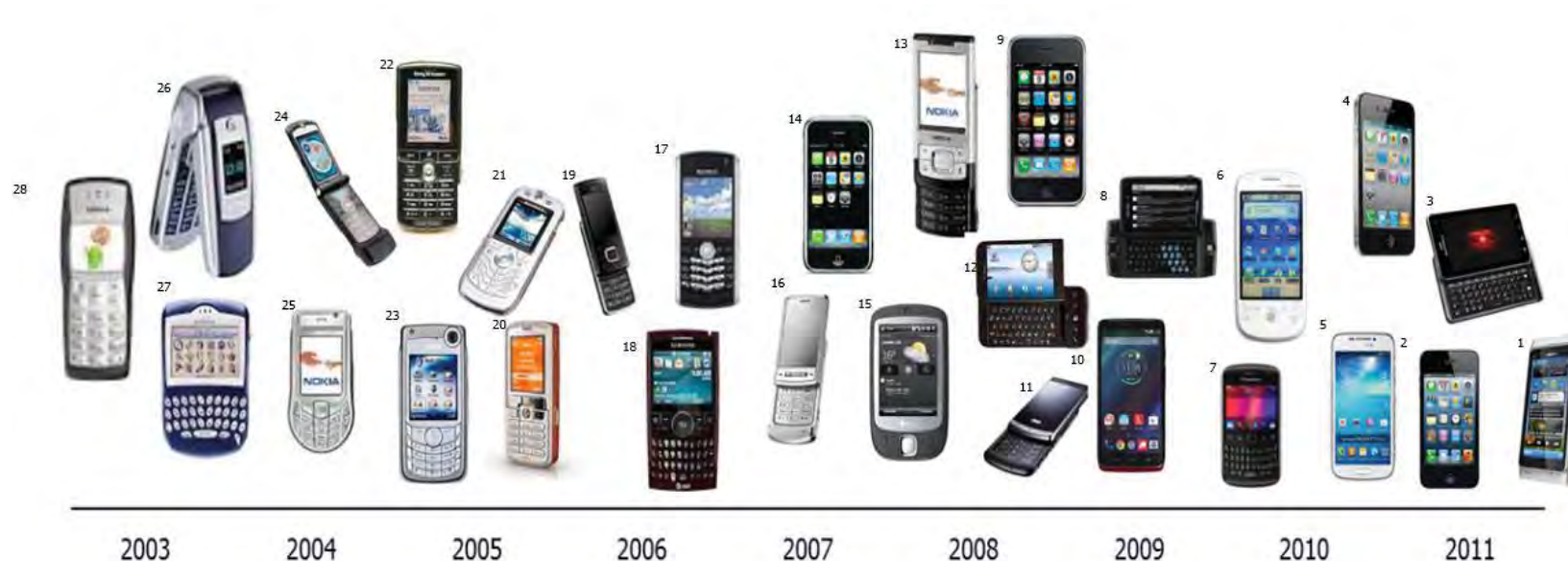
17) CSG Network, http://www.csgnetwork.com/javacheck html (last visited February 6, 2016).

Exhibit 19: Java Phone Continuum
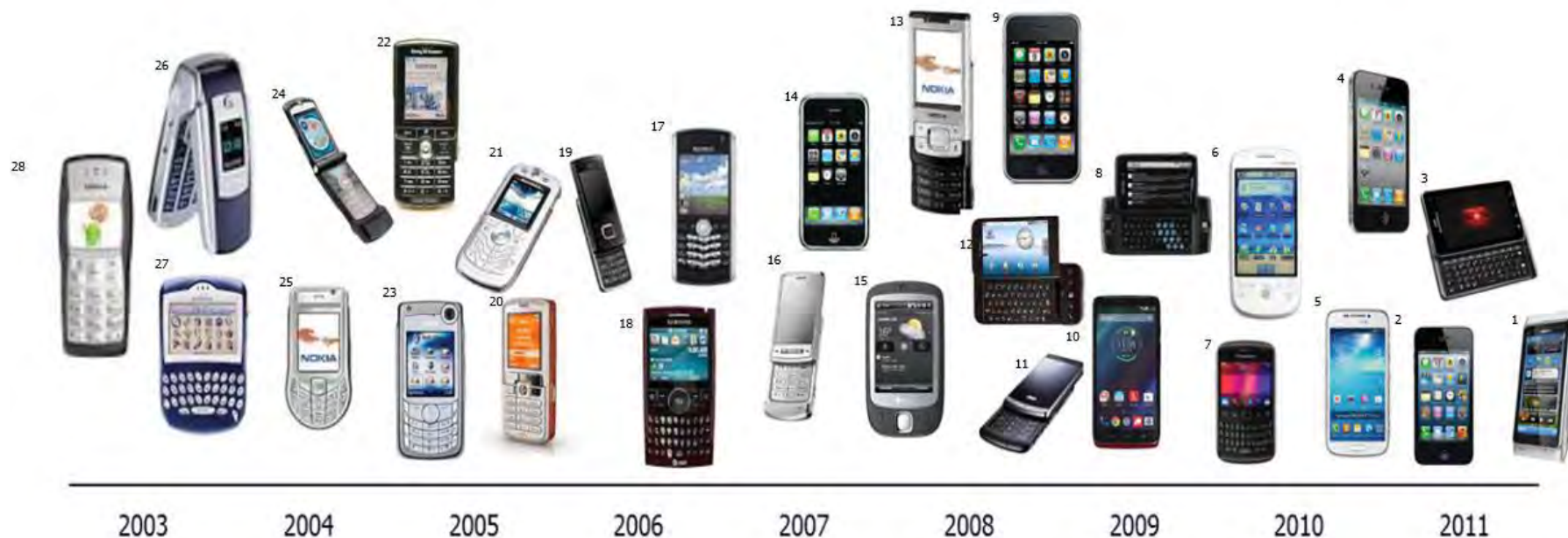
Sources:

1) *EMARTBUY NOKIA N8 SCREEN PROTECTOR 5-IN-1 PACK with MicroFibre cleaning cloth*, Amazon, http://www.amazon.co.uk/EMARTBUY-SCREEN-PROTECTOR-MicroFibre-cleaning/dp/B003O2FWS6/ref=pd_sim_23_2/280-7914095-7787331?ie=UTF8&dpID=41g79XRbO4L&dpSrc=sims&preST=_AC_UL160_SR92%2C160_&refRID=04E53Z9NJB8DT0YA6JAB (last visited February 6, 2016).
2) *Apple iPhone 4s,* Gadgets 360, http://gadgets ndtv.com/apple-iphone-4s-768 (last visited February 6, 2016).
3) *Motorola Droid 3*, http://www.gsmarena.com/motorola_droid_3-pictures-4036.php (last visited February 6, 2016).
4) *Apple iPhone4,* http://www.gsmarena.com/apple_iphone_4-3275.php (last visited February 6, 2016).
5) *The Case Studio,* http://thecasestudio.com/devices (last visited February 6, 2016).
6) *HTC Magic,* GSM Arena, http://www.gsmarena.com/htc_magic-2714.php (last visited February 6, 2016).
7) Blackberry Tune, http://www.blackberrytune.com/blackberry/curve-9350/ (last visited February 6, 2016).
8) *T Mobile Sidekick LX 2009*, GSM Arena, http://www.gsmarena.com/t_mobile_sidekick_lx_2009-2787.php (last visited February 6, 2016).
9) *Apple iPhone 3G,* GSM Arena, http://www.gsmarena.com/apple_iphone_3g-2424.php (last visited February 6, 2016).
10) Amazon, http://www.amazon.com/droid-turbo-64gb-case/cp/kotpprwbjb9p9a7 (last visited February 6, 2016).
11) *LG KF750 Secret Pictures*, GSM Arena, http://www.gsmarena.com/lg_kf750_secret-pictures-2352.php (last visited February 6, 2016).
12) *T Mobile G1,* GSM Arena, http://www.gsmarena.com/t_mobile_g1-pictures-2533.php (last visited February 6, 2016).
13) *Nokia 6500 Slide,* GSM Arena, http://www.gsmarena.com/nokia_6500_slide-1996.php (last visited February 6, 2016).
14) *Read these hilariously negative reactions to the original iPhone announcement,* BGR (Apr. 7, 2015), http://bgr.com/2015/04/07/original-iphone-reaction-comments.
15) What Mobile, http://www.whatmobile.com.pk/HTC_Touch (last visited February 6, 2016).
16) *LG KE970 Shine*, GSM Arena, http://www.gsmarena.com/lg_ke970_shine-1829.php (last visited February 6, 2016).
17) *Blackberry Pearl Black*, http://all-free-download.com/free-icon/icons/blackberry_pearl_black_89389 html (last visited February 6, 2016).

Exhibit 19: Java Phone Continuum (Continued)

18) Moby Ware, http://www mobuware net/free-samsung-blackjack-2-i617-device-software-download-959-all-1-date.html (last visited February 6, 2016).

19) TechnoTalk, http://www.technotalk.co.uk/phones html (last visited February 6, 2016).

20) Sony Ericsson W800, GSM Arena, http://www.gsmarena.com/sony_ericsson_w800-1089.php (last visited February 6, 2016).

21) *Motorola L6*, GSM Arena, http://www.gsmarena.com/motorola_l6-pictures-1118.php (last visited February 6, 2016).

22) Wikiwand, http://www.wikiwand.com/de/Sony_Ericsson_K750 (last visited February 6, 2016).

23) *Nokia 6680,* GSM Arena, http://www.gsmarena.com/nokia_6680-1045.php (last visited February 6, 2016).

24) Thrifty Computer, http://www.thriftycomputer.com/motorola-razr-v3-blue-unlocked-gsm-cell-phone-open-box.html (February 6, 2016).

25) Freeware Symbian, http://www freeware-symbian.net/nokia-6630-device-software-download-67-all-1-date html (last visited February 6, 2016).

26) Retrevo, http://www retrevo.com/support/Samsung-SGH-E700-Cell-Phones-manual/id/291ci869/t/2/ (last visited February 6, 2016).

27) MobiUA, http://mobiua.com/mobile/10689-RIM-BlackBerry-7220.html (last visited February 6, 2016).

28) Gadgets 360, http://gadgets ndtv.com/mobiles/news/nokia-1100-with-android-50-lollipop-quad-core-processor-spotted-667163 (last visited February 6, 2016).

Exhibit 20: Java Enabled Devices (in millions)

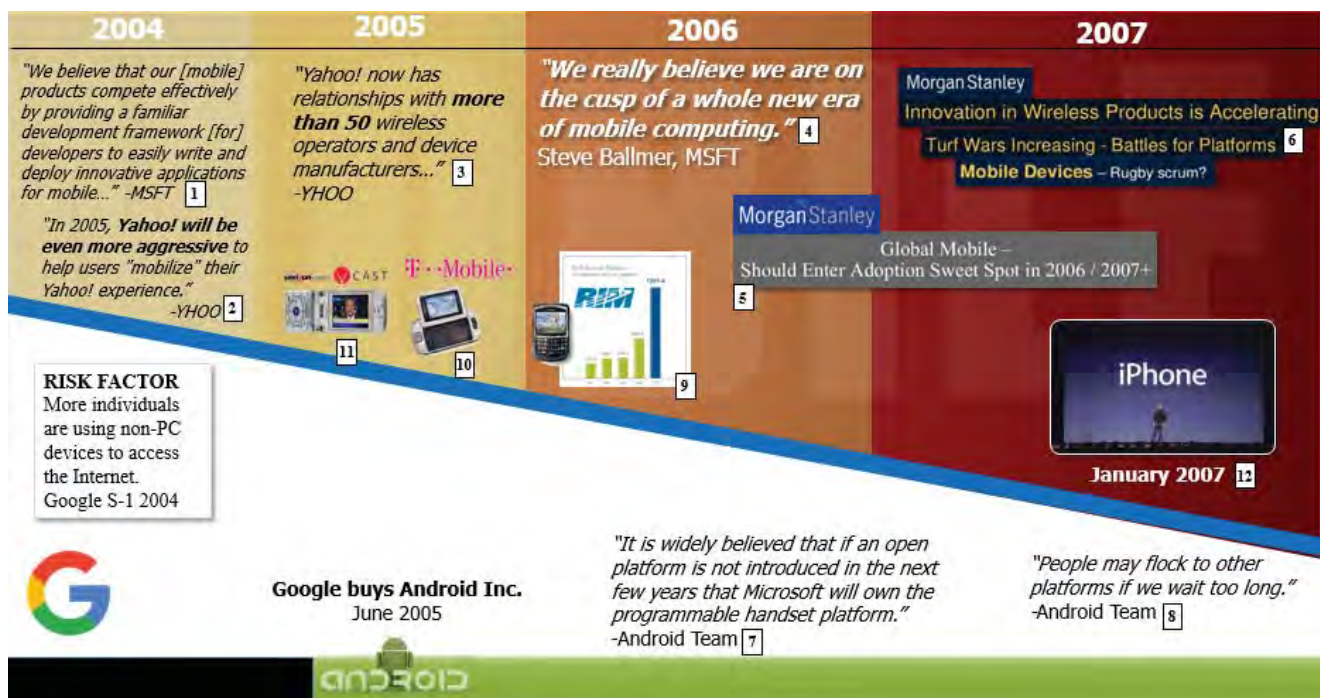|	Year	Java Devices
[1]	2003	120
[2]	2005	850
[3]	2006	1,000
[4]	2008	2,600

Sources:

[1]: https://web.archive.org/web/20031016011046/http://www.sun.com/smi/Press/sunflash/2003-10/sunflash.20031014.4.html

[2]: http://www.fieldtechnologiesonline.com/doc/action-engine-mobile-application-platform-del-0001

[3]: http://newsroom.sprint.com/news-releases/sprint-and-sun-microsystems-introduce-innovative-custom-development-solutions-to-java-me-community.htm

[4]: http://www.businesswire.com/news/home/20090602005541/en/Mobile-Industry-Collaborates-Advance-Java-Platform-Micro

Exhibit 21: Google's Window of Mobile Opportunity

Sources:

1. Microsoft SEC Form 10-K (2004), at 11.
2. Yahoo! Letter to Shareholders, Yahoo! 2004 Annual Report (2004), at 4.
3. Yahoo! Letter to Shareholders, Yahoo! 2005 Annual Report (2005), at 4.
4. Mark Veverka, Ballmer and Zander Make Nice in the Name of a Gadget Called Q, Barron's (Aug. 1, 2005), http://www.barrons.com/articles/SB112267936933700392.
5. Global Internet Trends, Morgan Stanley (Dec. 2006), p.19, *available at* http://www.morganstanley.com/views/perspectives/files/Global_Internet_Trends_121906_FINAL.pdf.
6. Technology / Internet Trends, Morgan Stanley (October 18, 2007), P. 29 *available at* http://www.slideshare.net/2tique/technology-internet-trends.
7. October 12, 2005 email from Rich Miner to Andy Rubin: "It is widely believed that if an open platform is not introduced in the next few years then Microsoft will own the programmable handset platform." (GOOGLE-01-00019529 at 530)
8. GOOGLE-29-00002338
9. Research in Motion 2005 Annual Report, available at http://us.blackberry.com/content/dam/bbCompany/Desktop/Global/PDF/Investors/Documents/2005/2005rim_ar.pdf.
10. *T-Mobile Sidekick II*, PCMag available at http://www.pcmag.com/slideshow_viewer/0,3253,l=261206&a=261206&po=2,00.asp accessed February 8, 2016.
11. Paul Farhi, *Channel Surfing, Erosion & Networks Treading Water* The Washington Post, Sept 18, 2005, available at http://www.washingtonpost.com/wp-dyn/content/article/2005/09/16/AR2005091600367.html.
12. *Apple Revinvents the Phone with iPhone,* Apple Press Info, 1/9/2007, http://www.apple.com/pr/library/2007/01/09Apple-Reinvents-the-Phone-with-iPhone html.

Oracle America, Inc. v. Google Inc.
Case No. CV 10-03561 WHA

Exhibit 22: Examples of Java Customers, Potential Opportunities, and Lost Opportunities

Product Category	OEM	Source	Quote
Phones	General	OAGOOGLE0000154715	• "Java is the used [*sic*] extensively for Smartphone class devices[.] 8 of 10 leading Smartphone platforms are Java based[.]"; slide generally contains plans for not only mobile but TV and other markets.
Phones	Samsung	OAGOOGLE2000031102	• ██████████████████████████████████ ████████████████████████████████
		OAGOOGLE2000059830	• "My fear is that Gaia goes with Google/Android. . . Gaia/Aplix/iaSolution is deep rooted in Japan and China. Losing Gaia in Java community means a huge mountain to climb for Java embedded business in JAPAC."
		OAGOOGLE2000180299	• ████████████████████████████ ████████████████████████████ ████████████████████████ ████████████████████
		Deposition of Mike Ringhofer, Dec. 2, 2015, 20:9-21	• ████████████████████████████ ████████████████████████████ ████████████,"
		Deposition of Mike Ringhofer, Dec. 2, 2015, 69:13-25	• ████████████████████████████ ████████████████████████████ ████████████████████████████ ████████████████████████████████
		Deposition of Mike Ringhofer, Dec. 2, 2015, 81:22-24	• ████████████████████████ ██████████████

Product Category	OEM	Source	Quote
		Deposition of Georges Saab, Dec. 16, 2016, 47:17-22	████████████████████ ████████████ "█████████████████████ ████████████
Phones	████████	Deposition of Mike Ringhofer, Dec. 2, 2015, 18:1-10	████████████████████ ████████████████████ ████████████████████████ █████████
Phones	Kyocera	Deposition of Mike Ringhofer, Dec. 2, 2015, 23:14-22	████████████████████████ ████████████████████ █████████████
		Deposition of Mike Ringhofer, Dec. 2, 2015, 87:4-7	████████████████████ ████████
		OAGOOGLE2000125785	"Though we have an approval of MDE, now the schedule is a big concern, as we found the Inbound License was not completed between Oracle and Qualcomm US side for us to start work on the target board. The license with Qualcomm seems to take further time . . . We will continue talking to KDDI, Kyocera and Qualcomm, watching our US HQ movement."
Phones	████	Deposition of Mike Ringhofer, Dec. 2, 2015, 24:4-10	████████████████████████ ████████████████ ██████"
		Deposition of Mike Ringhofer, Dec. 2, 2015, 87:19-254	"█████████████████ ████████████████████████ ████████████
Phones	████████	Deposition of Mike Ringhofer, Dec. 2, 2015, 72:19-73:1	████████████████████ ████████████████████
		Deposition of Mike Ringhofer, Dec. 2, 2015, 88:3-11	████████████████████████ ████████████████████████ ████████████████████ ████████
Phones	████	Deposition of Mike Ringhofer, Dec. 2, 2015, 44:19-45:5	████████████████████████ ████████████████

2

Product Category	OEM	Source	Quote
		Deposition of Mike Ringhofer, Dec. 2, 2015, 46:3-9	██████████████████████
		Deposition of Mike Ringhofer, Dec. 2, 2015, 51:13-20	██████████████████████
		Deposition of Mike Ringhofer, Dec. 2, 2015, 88:15-24	██████████████████████
		Deposition of Georges Saab, Dec. 16, 2016, 59:8-16	██████████████████████
		Deposition of Henrik Stahl, Jan. 14, 2016, 149:9-14	██████████████████████
Phones	Motorola	OAGOOGLE2000011623	• "Java business at Moto dropped off significantly last fiscal [2012] due to their commitment to Android and eventual purchase of Mot Mobility patents by Google."
Phones	████	OAGOOGLE2000181111 OAGOOGLE2000180278	██████████████████████
Phones	Vodafone	OAGOOGLE2000181179	• Vodafone "Statement of Work No. 5 to Sun Engineering Services Agreement No. 136188, Version 1.11, Issued 19th January 2004"
Phones	Sony Ericsson	OAGOOGLE2000061527 OAGOOGLE0000804592 OAGOOGLE2000061817	• "SEMC is quickly phasing out their feature phone portfolio … The rest of their handsets arer [sic] based on Android." • "their [sic] increasing usage of Android and reducing usage of Java" • "SEMC – they have been designing us out for Android … it seems that they want some relationship with us as a hedge"

Product Category	OEM	Source	Quote
Phones	ZTE	Deposition of Mike Ringhofer, Dec. 2, 2015, 76:11-19	• █████████████████████████
		OAGOOGLE2008898614	• "ZTE is using 100% OJWC [Oracle Java Wireless Client] for all their feature phones."
Phones	Huawei	Deposition of Mike Ringhofer, Dec. 2, 2015, 76:11-19	• █████████████████████████
		OAGOOGLE2008898614	• "However, you may check with Land for Huawei who is using significant Gaia/Aplix implementations across couple of product lines from GSM/GPRS to TD_SCDMA which doesn't pass-through the revenue from Gaia/Aplix to Oracle but pay directly from Huawei in prepay license with Oracle, the impact may be big to Huawei if Gaia/Aplix drop the Java license."
Phones	HTC	OAGOOGLE0001156560	• "It was a sobering meeting for Oracle as our HTC counterparts explained how their java shipments will dry up very quickly as they migrate over to Android devices. Furthermore and most importantly for us, they intend not to make any prepayment."
Phones	Sprint, Verizon, AT&T, T-Mobile	OAGOOGLE0000799926	• "I see Android and am run over by it in all accounts."
Wearables	General	OAGOOGLE2000075576	• "Digital Medical Equipment Industry, Smart communications, Industry challenges: Wearable, hands-free"
Wearables	LG Electronics	OAGOOGLE2000023928	• "It happens what we were afraid of in Korea IoT market. … LG Electronics will also announce Android-Wearable platform as a wearable device (within 3 months)"
		OAGOOGLE2000022801 OAGOOGLE2000023647 OAGOOGLE2000022801	• "█████████████████
		OAGOOGLE2000131360	• We have a $220K ME8.1 FPE opportunity with LGE IoT team for healthcare and other smart devices." March 2015 email

Product Category	OEM	Source	Quote
		Deposition of Mike Ringhofer, Dec. 2, 2015, 102:12-14	▮
Wearables	▮	OAGOOGLE2000054847	▮
		OAGOOGLE2000077924	▮ ."
		OAGOOGLE2000023808	▮
		Deposition of Mike Ringhofer, Dec. 2, 2015, 83:6-10	▮
		Deposition of Mike Ringhofer, Dec. 2, 2015, 102:15-18	▮
Wearables	▮	OAGOOGLE2000128379	▮
		Deposition of Mike Ringhofer, Dec. 2, 2015, 102:19-23	▮
Automotive	▮	OAGOOGLE2000095625	" ▮ "
Automotive	Volkswagen	OAGOOGLE2000055353	"Not only JavaME 8 is the Volkswagen requirement but also JavaME 8 is the best platform for this type of device … Volkswagen and LGE have experiences with less quality of other vendor solutions such as IBM J9 and Android. This JavaME 8 platform will mitigate their concerns."
		Deposition of Mike Ringhofer, Dec. 2, 2015, 26:7-14	▮
		Deposition of Mike Ringhofer, Dec. 2, 2015, 109:12-110:1	▮

Product Category	OEM	Source	Quote
		Deposition of Mike Ringhofer, Dec. 2, 2015, 110:4-12	• ██████████████
Automotive	██	OAGOOGLE2006035268	• " ██████████
Automotive	██ ██	Deposition of Mike Ringhofer, Dec. 2, 2015, 106:9-11	• ██████████ "
Automotive	██	Deposition of Mike Ringhofer, Dec. 2, 2015, 105:20-106:18	• " ██████████ "
Automotive	██	Deposition of Mike Ringhofer, Dec. 2, 2015, 108:15-109:5	• ██████████████
Automotive	██	OAGOOGLE2000128185	• ██████████ "
		OAGOOGLE2000180517	• ██████████ "
Automotive	██ ██	Deposition of Mike Ringhofer, Dec. 2, 2015, 25:22-26-6	• ██████████
		Deposition of Georges Saab, Dec. 16, 2016, 97:20-25	• ██████████
		OAGOOGLE2006035268	• ██████████

Product Category	OEM	Source	Quote
Automotive	▮	Deposition of Mike Ringhofer, Dec. 2, 2015, 109:12-17	• ▮▮▮
		Deposition of Mike Ringhofer, Dec. 2, 2015, 110:13-15	• ▮▮
Automotive	▮	Deposition of Mike Ringhofer, Dec. 2, 2015, 109:12-17	• ▮▮ ,"
		Deposition of Mike Ringhofer, Dec. 2, 2015, 110:13-15	• ▮
		OAGOOGLE2000095625 at 629	• ▮
Automotive	▮ ▮	OAGOOGLE2000118005	• ▮▮
Automotive	▮	Deposition of Georges Saab, Dec. 16, 2016, 106:21-107:2	• ▮▮
Automotive	Denso	Deposition of Georges Saab, Dec. 16, 2016, 148:25-149:7	• ▮▮▮▮
		OAGOOGLE2000039770	• "Fortunately, Denso is now evaluating Java SE-E8 of QNX/ARM for in-car gateway and making a demo application for their private exhibition at the end of March. We need to offer not only Java VM technology but also Oracle back-end solutions which are clouds, Middleware and center server. And they are interested in other customer use case."
Automotive	▮	OAGOOGLE2000097108	• ▮
Televisions	Ginga-J	OAGOOGLE2000030936	• "The communications group at Broadcom owns 70% of the digital Set Top box processor market and let us know it was approximately worth $2 billion dollars. BRICA is definitely a target focus for Broadcom, along with any ideas on how to maintain and grow their current market share using Oracle Java. Broadcom is acutely aware of OCAP, Tru2Way, Ginga-J etc so there is not a lot of convincing to do that Java is a market requirement."

7

Product Category	OEM	Source	Quote
Televisions	TPV	Deposition of Mike Ringhofer, Dec. 2, 2015, 111:7-12	● ███████████████████████
		OAGOOGLE2008695851	● "FY15 Outlook. Opportunity: TPV—Royalty, Odds: 50%, Q4: $500,000"
Televisions	TQTVD	Deposition of Mike Ringhofer, Dec. 2, 2015, 111:7-12	● ███████████████████████
		OAGOOGLE2008695851	● "FY15 Outlook. Opportunity: TQTVD—Royalty, Odds: 30%, Q4: $800,000"
Televisions	████	Deposition of Mike Ringhofer, Dec. 2, 2015, 111:7-12	● ███████████████ acle licensee? A. TPV, TQDVD and M-Star, they are all licensees."
Televisions	██████	Deposition of Mike Ringhofer, Dec. 2, 2015, 113:16-114:12	● ███████████████████████
Televisions	████	OAGOOGLE2000180303	● ███████████████████████
		OAGOOGLE2000222133	● ███████████████████████
Blu-Ray	General	OAGOOGLE2000101486	● "100% of all Blu-ray players run Java"
Blu-Ray	██████	OAGOOGLE2000228794	● ███████████████████████

Product Category	OEM	Source	Quote
Blu-Ray	▮▮▮▮▮▮	Deposition of Mike Ringhofer, Dec. 2, 2015, 18:1-13	• "▮▮▮"
		Deposition of Mike Ringhofer, Dec. 2, 2015, 116:12-21	• "▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮"
Media Players (including set-top boxes)	General	OAGOOGLE2000253473	• "▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
		OAGOOGLE0000154715	• "Worldwide MSO set-top box standards require Java."
Media Players / Set-top Boxes	▮▮▮▮▮▮	Deposition of Mike Ringhofer, Dec. 2, 2015, 117:5-7	• ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
		Deposition of Mike Ringhofer, Dec. 2, 2015, 119:25-120:22	• ▮▮
Media Players / Set-top Boxes	▮▮	Deposition of Mike Ringhofer, Dec. 2, 2015, 117:16-18	• ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮
Media Players / Set-top Boxes	▮▮	Deposition of Mike Ringhofer, Dec. 2, 2015, 117:16-18	• ▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮"
Media Players / Set-top Boxes	▮▮	Deposition of Mike Ringhofer, Dec. 2, 2015, 117:16-18	• ▮▮▮▮▮▮▮▮▮▮▮▮
Media Players / Set-top Boxes	OCN	OAGOOGLE0011787884	• "TV & Embedded LOB – Pipeline. OCN. Probability %: 70%
▮▮▮▮▮	▮▮▮▮	▮▮▮▮▮▮▮	▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮d grow their current market share using Oracle Java. Broadcom is acutely aware of OCAP, Tru2Way, Ginga-J etc so there is not a lot of convincing to do that Java is a market requirement."

Product Category	OEM	Source	Quote
		OAGOOGLE2000030936 OAGOOGLE20000029767 at 1-2	• "Broadcom offers a software framework called Trellis to their ODMs and service providers for the plug and play of development and delivery of digital TV applications and services. Java Run Time competition: Android (and Skelmir, Adobe Air, HTML 5)" • "[Broadcom] believed [Oracle is] more stable in the long term, produce focused once [Oracle] optimize [its] binaries, active in the standard bodies …, have credibility and brand recognition with the carriers." • "This opportunity is about taking our market share back in the TV market. Broadcom is the leader. Clean room implementors have been undercutting us for years, and anything we take here is net new $$."
Media Players / Set-top Boxes	Alticast	OAGOOGLE2000066068 Deposition of Mike Ringhofer, Dec. 2, 2015, 117:10-18	• "Alticast has indicated … that they have Android and HTML5 solutions ready for the market and are prepared to migrate their licensees to these solutions." • ███████████████████████████
Media Players / Set-top Boxes	███	OAGOOGLE2000077924	• ████████████████████████████████

Product Category	OEM	Source	Quote
		OAGOOGLE2008902960	**Java licensee in the Market** Coship • One of the largest STB OEMs in China,10%+ of the STB market share,10% of the DTV STB middleware market • FY10 revenue is about 300M $,10M+ annual STB manufacturing capacity. • Good relationship with some local key market carriers like ShenZhen Topway and BeiJing GeHua. • End to end DTV solution DTV provider. • Announced the strategic partnership with SUN in 2009 CDTF BeiJing, Java CDC BVAP of Oracle. • SOW#1 of Java CDC for media and SOW#2 of Java CLDC for Mobile have been done. • Coship want to be the Java CDC source code licensee. • Glad to cooperate with Oracle Java in the overseas market and domestic market development ORACLE © 2010 Oracle Corporation Proprietary and Confidential Internal Use Only Page 13
Media Players / Set-top Boxes	Comcast	OAGOOGLE2008747127	• ▮
		OAGOOGLE2000030936	• "The communications group at Broadcom owns 70% of the digital Set Top box processor market and let us know it was approximately worth $2 billion dollars. BRICA is definitely a target focus for Broadcom, along with any ideas on how to maintain and grow their current market share using Oracle Java. Broadcom is acutely aware of OCAP, Tru2Way, Ginga-J etc so there is not a lot of convincing to do that Java is a market requirement."
		OAGOOGLE2000030936	• "Shared Tier 1 Customers between Oracle and Broadcom: Comcast, Time Warner, and every other STB manufacturer in the world."
Game Consoles	▮	Deposition of Mike Ringhofer, Dec. 2, 2015, 121:15-122:7	• ▮ "

11

Product Category	OEM	Source	Quote
Game Consoles	████	Deposition of Mike Ringhofer, Dec. 2, 2015, 121:15-122:1	███
Web Browsers	████	Deposition of Mike Ringhofer, Dec. 2, 2015, 122:8-16 Deposition of Mike Ringhofer, Dec. 2, 2015, 122:24-123:1 Deposition of Georges Saab, Dec. 16, 2016, 116:5-13	███ "███ s." ███
Household Appliances	███	OAGOOGLE200007581 OAGOOGLE2000094077	███
Household Appliances	████	OAGOOGLE200007581	███
Household Appliances	███	OAGOOGLE2000023783	███
Household Appliances	███	OAGOOGLE2000128379 Deposition of Mike Ringhofer, Dec. 2, 2015, 83:11-14	███ r █ ███ "
Household Appliances	███	OAGOOGLE20000180777	███

Product Category	OEM	Source		Quote
Household Appliances	██████████	OAGOOGLE2000062898	•	████████████████
Internet of Things	█████	OAGOOGLE2006020696	•	██████████████████ ."
Internet of Things	██████████	OAGOOGLE2000089528 at 36 Deposition of Mike Ringhofer, Dec. 2, 2015, 33:24-34:2	• •	████████████████ " ████████████████
Internet of Things	Wind River	OAGOOGLE2000057258	•	"Windriver has an Android strategy – they've hired 100 developers to create solutions"
Internet of Things	██████	OAGOOGLE2000005781	•	███████████████ lcomm, Philips, Bosch, Elbrys networks, Prodea, Omron, etc .."
Internet of Things	Huawei	OAGOOGLE2000057258	•	"competing with Dalvik on M2M – is a problem … groups within Huawei & ZTE"
Internet of Things	███	OAGOOGLE2000180771	• •	██████████████████ ██████████████████
Internet of Things	███	OAGOOGLE2000062129	•	██████████████████
Internet of Things	██████	OAGOOGLE2006020696	•	██████████████████
Internet of Things	█████	OAGOOGLE2006020696	•	██████████████████
Internet of Things	██████	OAGOOGLE2006020696	•	██████████████████
		OAGOOGLE2006020696	•	██████████████████
Internet of Things	███	OAGOOGLE2006020696	•	██████████████████
		OAGOOGLE2006020696	•	██████████████████
Internet of Things	███	OAGOOGLE2006020696	•	██████████████████
Internet of Things	█████	OAGOOGLE2006020696	•	██████████████████

Product Category	OEM	Source	Quote
Internet of Things	██████████	OAGOOGLE2006020696	• ████████████████ ████████
Internet of Things	█████	Deposition of Mike Ringhofer, Dec. 2, 2015, 20:9-18	• ███████████████████████
		Deposition of Mike Ringhofer, Dec. 2, 2015, 21:13-19	• ████████████████████
Tablet	███	OAGOOGLE2000180086	• ████████████████████
Cameras	Nikon	OAGOOGLE2000059827	• "Java is not used in Digital Camera today. But Nikon released one model based on Android the other day. But we have hope to let them use Java."
Cameras	██████	OAGOOGLE2000180771	• ██████████████
		OAGOOGLE2007614035	• ██████
Cameras	Shikino High Tech	OAGOOGLE2000125785	• "Security Camera System: Found out they are major CMOS Camera supplier with 100% share in ATM and Kiosk Terminal at major convenience stores. Current using C/C++ on Linux with 512MB RAM. Now they are OK with switching to Java. We need more investigation of their volume in each market segment for us to figure out our business potential and strategy."
Cameras	████████	OAGOOGLE2007614035	• "██████████████ • ████████████████
Cameras	████████	OAGOOGLE2007614035	• ████████████
Cameras	████████	OAGOOGLE2007614035	• ████████████

Product Category	OEM	Source	Quote
Cameras	███████	OAGOOGLE2007614035	• " ████████████████
Cameras	███████	OAGOOGLE2007614035	• ████████████████
E-readers	████	OAGOOGLE2000060932 Deposition of Georges Saab, Dec. 16, 2016, 45:5-7 OAGOOGLE2007775909	• ████████████ " • ████████████ • ████████████
E-readers	████████	OAGOOGLE2000180051 Deposition of Donald Smith 30(b)(6) and Individual, Nov. 20, 2015, 114:11-14 Deposition of Georges Saab, Dec. 16, 2015, 62:11-19	• ████████████ • ████████████ • ████████████
VoIP Phones	████	Deposition of Mike Ringhofer, Dec. 2, 2015, 35:12-14 OAGOOGLE2008897992	• ████████████ • ████████████

Product Category	OEM	Source	Quote
VoIP Phones	▮▮▮	OAGOOGLE2008897992	• "▮▮▮▮▮▮▮▮▮▮▮▮▮"
VoIP Phones	▮▮	OAGOOGLE2008897992	• ▮▮▮▮▮▮▮▮▮▮
VoIP Phones	▮▮ ▮▮	OAGOOGLE2008897992	• ▮▮▮▮▮▮▮▮▮
Printers	▮▮▮	Deposition of Donald Smith 30(b)(6) and Individual, Nov. 20, 2015, 121:3-6	• "▮▮▮▮▮▮▮▮▮"
Printers	▮▮	OAGOOGLE2008897992	• ▮▮▮▮▮▮▮▮▮
Printers	Fuji Xerox	OAGOOGLE2000125785 OAGOOGLE2008897992	• "Fuji Xerox now thinks about applying our Java base IoT solution to their MFP base system. . . Fuji Xerox wants us and Murata to involve other MFP makers to apply our IoT solution as an industry solution. They also want us to gather representative persons from each MFP makers to discuss to make one common data protocol around MFP as gateway as a working group, or consortium in the end. I am talking to FMW about the idea for band End [sic] side." • ▮▮▮▮▮▮▮▮▮
Printers	Canon	OAGOOGLE2000255195 OAGOOGLE2000227977 OAGOOGLE2008897992	• "Ongoing business: . . . We expect 1.5 M units in FY15 by printer companies. (JavaFX is a key function). Fuji Xerox will ship new products with Java SE-E. Canon is evaluating Java SE on both MFP and ink-jet Printer." • ▮▮▮▮▮▮▮▮▮ • ▮▮▮▮▮▮▮▮▮ • ▮▮▮▮▮▮▮▮▮
Printers	▮▮	OAGOOGLE2008897992	• ▮▮▮▮▮▮▮▮▮
Printers	Samsung	OAGOOGLE0000398897	• "Samsung printer committed to use Java for their next MFP. Samsung signed SOW 25 guaranteeing emb SE ARM build release for Samsung."
GPS	▮▮	OAGOOGLE2009819421	• ▮▮▮▮▮▮▮▮▮

Product Category	OEM	Source	Quote
			just accepting Android + ipk + google play app store / iOS + Apple hardware + iTunes app store…) and they're interested in using Java SE / JavaFX for these devices."
Vending Machines/Kiosks	Consolis	OAGOOGLE2000126883	• "Background: POS and Kiosk manufacturers, Retail software device platforms. Good range of big players (Toshiba, Star, Panasonic) and smaller specialist companies. Key observations: Lots of Android and Windows presence both on the devices themselves and all of the banners and literature. Lots of cloud based solutions and thin client terminals. Clear movement from traditional 'tills' to more PC/Apple/Android based POS terminals." "Consolis: Hans Johansson in the Technical Director. Using FoxPro on some terminals! At migration point - looking at Android. Will make contact after the show."
Vending Machines/Kiosks	▮	OAGOOGLE2000180771	• "▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮▮"
Vending Machines/Kiosks	Panasonic	OAGOOGLE2000125785	• "Agreements process (iES) under going: PSN Vending Machine: BLRA – at BP"
Payments Terminals and Point of Sale Terminals	Magtek, Newland, Sequoia, BSquared, Future4POS	OAGOOGLE2000126883	• "Magtek: Doing some work with Java and provide a Java based SDK. No technical knowledge on this stand but have follow-up contact details to get more info." • "Newland: 2 types of terminals and handheld scanners. Currently Linux based. No awareness of Java in this space" • "Sequoia aka Kiosks4Business: Hardware kiosk manufacturer based in Spencers Wood. Generally just provide terminals and software platform is directed by the end customer. Would be open to meeting. To contact after show." • "BSquared. Geoff has already met with them apparently. Early days relationship discussions. Very keen to work with us further and strong Java supporters." • "Future4POS: Revisited booth 4 times but they were always busy. The only visible use of Java that I saw of the show as they have a tag line displayed on the booth saying 'Futura4POS [sic] – 4th generation Java based EPOS'"
Payments Terminals and Point of Sale Terminals	Denso Wave	OAGOOGLE2000125785	• "Moving forward with NEC as Sler toward the end user Suzuken, a major retail stores. Java ME on Windows CE6 and Embedded Compact 7. They prefer AWT, but we try to have them use JavaFX.

Product Category	OEM	Source	Quote
			We are driving NEC toward the direction by showing JavaFX demo on CE platform next week."
Payments Terminals and Point of Sale Terminals	███████	OAGOOGLE2007614035	• ███████████████████████████
Payments Terminals and Point of Sale Terminals	████████	OAGOOGLE2007614035	• "████████████████████████
Payments Terminals and Point of Sale Terminals	██████	OAGOOGLE2007614035	• █████████████████████████████████
Payments Terminals and Point of Sale Terminals	█████	OAGOOGLE2007614035	• ██████████████████████████████
Payments Terminals and Point of Sale Terminals	Clover, Hoft & Wessel, YesPay, Enactor	OAGOOGLE2000126883	• "Clover: Android based open terminal. Very new to market with designed terminals. Very Appleish and adopting a similar business model in terms of encouraging an open developer platform and store for retailers to purchase new applications. Apps predominantly run in the cloud." • "Hoft & Wessel: Android and Windows based payment terminals and kiosks. Not aware of any Java discussions within the company." • "YesPay: Java running on payment terminals. May be dated 1.6? No technical details available. Needs more background." • "Enactor: Software solutions for retail. All Java based. Crying out for a closer relationship with us. Open to joint press, displaying and advertising Java logo etc. Have some high profile deployments of Java within retail. They mentioned Harrods and having just supplied an additional 300 units. I didn't push too heavily at this point on the monetization point but we need to explore this in a follow-up meeting"

18